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Outstanding Butterfat Production.

Success of Lepperton Farmer.

A. G. Elliott, Instructor in Agriculture, Fields Division.

In 1924 Mr. J. N. Blyde purchased a farm of 51 acres then carrying twenty-three cows and producing 7,200 lb. of butterfat, an average per acre of 142 lb. For the season ended in June, 1937, the total production from forty-seven cows was 18,368 lb. butterfat, or 360 lb. per acre, and a review of the methods employed in effecting this outstanding improvement will probably interest all dairy-farmers.

After arriving in New Zealand from England in 1911, Mr. Blyde spent four years as a farm hand prior to going to the war, and on his return was engaged in share milking until taking over his present property. Financially he was in precisely the same position as were so many of the present successful dairy-farmers of Taranaki, and the improvements on the farm have been effected with increasing returns from the land. The herd taken over consisted of grade Jerseys with a per-cow average of just over 300 lb. of butterfat, and grades are still carried, although per-cow production has been increased. The pastures were all old, and on analysis showed up to 50 per cent. *Poa pratensis* and similar low-dairy-production grasses. The change to the present rye-grass - cocksfoot - timothy - white-clover sward was brought about as a result of adequate top-dressing and good pasture management and utilization.

Fig. 1.—Subdivisions and shelter. The herd is in the background.

Top-dressing Programme.

In 1924 the area was subdivided into eight fields, and all were top-dressed with superphosphate at the rate of 4 cwt. per acre, while in the following autumn 10 tons of basic slag and 10 tons of carbonate of lime were applied, giving marked improvement, the twenty-eight cows returning 9,460 lb. of butterfat. Hay and ensilage were saved, and an area of 1¼ acres of mangels and carrots grown for winter and early spring feed. In the spring of 1925, 30-per-cent. potash was used for the first time, the top-dressing mixture being 4 cwt. basic slag, 4 cwt. carbonate of lime, and ¾ cwt. potash per acre. In the following season thirty-four cows produced just over 12,000 lb. butterfat, giving an average per acre of 235 lb., which was a considerable increase for the time of occupation.

This year also saw the first trial of the twice-yearly top-dressing, as basic slag was applied in the autumn followed by superphosphate plus 30-per-cent. potash in the spring. The season 1927–28 concluded with a very dry autumn, and although the herd was 700 lb. ahead of the previous butterfat-production up to the end of December, the total for the season was lower than that of the preceding year During the period under review all stock had been wintered on the farm, and all feed was saved and crops grown on the original area ; but for the next four years a nearby holding was leased for carrying dry cows and calves, and also for harvesting hay and ensilage.

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The top-dressing programme outlined was continued, and production was raised to 15,000 lb. of butterfat from both areas, but, commencing with the 1932–33 season and relying solely on the homestead block, Mr. Blyde secured just over 12,500 lb. butterfat from thirty-eight cows. The following year the herd, then increased to forty-two cows, produced just over 15,380 lb. butterfat, an average per acre of 300 lb., which must be regarded as a very fine performance.

Wintering of Stock.

It must be emphasized that from 1933–34 season all stock were wintered on the area, and all feed produced on the farm which was then subdivided into twelve fields, one of which is 9 acres, and the remainder 3½ acres to 4 acres in area. Shelter is provided by boxthorn and *Lawsoniana* hedges along boundary and subdivision fences, while water is drawn from the Waitara Borough supply and gravitated to troughs in each field. The top-dressing programme had been somewhat changed, and the quantities applied were carbonate of lime 4 cwt. to 6 cwt. per acre in the winter, followed by 2½ cwt. superphosphate and 1½ cwt. 30-per-cent. potash in the spring. An additional application of superphosphate and 30-per-cent. potash is applied in November or December, the total cost last season being 38s. 6d. per acre distributed.

In the winter of 1935 a modern eight-bail cow-shed with concrete yard and race was built, and a sump to contain 1,000 gallons of shed washings was installed. During the main-production months the sump contents are pumped into a 200-gallon distributing-tank once a week, and either applied to the pastures or on to the small area intended for cropping. Marked results have attended the introduction of this practice, particularly on pastures, and last season from observations only it appeared that the washings so applied were equivalent to a top-dressing of 1½ cwt. to 2 cwt. sulphate of ammonia as shown by adjoining strips in the field.

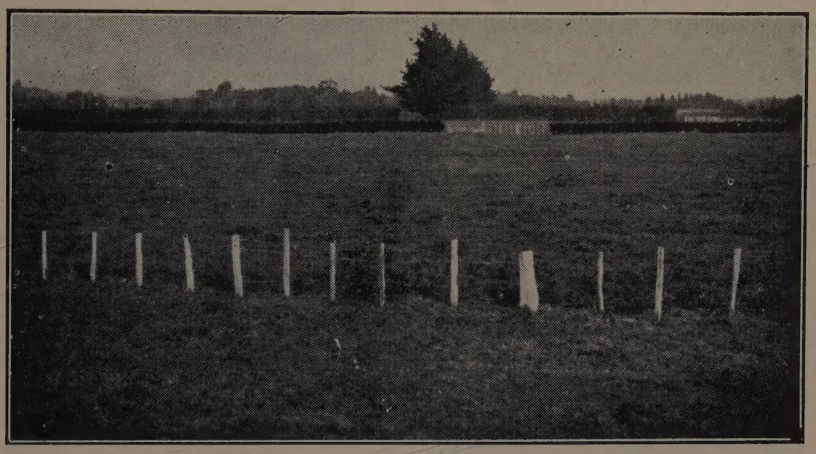

Fig. 3.—Field for winter grazing. Note subdivisions and shelter.

Butterfat-production.

Butterfat-production for 1934–35, which was a very dry season, showed a decrease to 284 lb. per acre from forty-five cows, but in the following year, under more favourable conditions, fifty cows carried to the end of January and later reduced to forty-seven produced just under 17,200 lb., a per-acre average of 337 lb. For the season concluded at the end of June, 1937, the herd of forty-seven grade cows, including seven heifers and four carried over, produced 18,368 lb. of butterfat, or 360 lb. per acre, which must be regarded as a wonderful achievement on land normally not regarded as of good natural fertility.

A summary of the production figures is as follows :—

Season.	Cows.	Pounds Butterfat.	Pounds Butterfat per Acre.
1921–22 ..	23	7,200	141
1924–25 ..	28	9,460	184
1925–26 ..	34	12,000	235
1932–33 ..	38	12,538	245
1933–34 ..	42	15,381	307
1934–35 ..	45	14,484	284*
1935–36 ..	50–47	17,199	357
1936–37 ..	47	18,368	360

* Very dry season.

Monthly production butterfat figures as below are also of interest :—

Month.	1935–36.	1936–37.
	lb.	lb.
July	289·85	444·96
August ..	1,322·46	1,519·35
September ..	1,896·90	1,902·69
October ..	2,139·61	2,070·03
November ..	1,876·05	1,811·71
December ..	1,908·10	1,912·74
January ..	1,826·90	1,867·85
February ..	1,545·56	1,644·23
March ..	1,570·37	1,789·63
April ..	1,477,32	1,645·94
May	915·69	1,209·11
June ..	431·07	550·40
Total ..	17,199·78	18,368·64
Average per acre	337	360

Root Crops.

During this period of thirteen years only 12 acres have been ploughed, an area of approximately 1½ acres per year being devoted to mangels and carrots. These are grown in 12 in. to 14 in. drills and well cultivated, the yields last season being at the rate of 95 tons and 72 tons per acre respectively. The crops are followed by temporary pasture, and later the whole block of successive small areas is sown down permanently, using certified and pedigree strains of seed. With the exception of this 12 acres, the balance of the farm is in pasture over twenty years old, and while some chain harrowing for the spread of droppings is carried out during the dormant period of pasture growth this at other times is sufficient to disintegrate cow-droppings.

For cows calving in July and August, two fields are top-dressed and closed up in April, and these are grazed for a few hours each day in the early spring, providing a good ration with hay, ensilage

Fig. 2.—Field after rotational grazing. Mangels and carrots in the background.

and roots. Feeding-out generally commences in May, and is continued until the end of August, depending on the season, ensilage being followed by fresh grass with carrots and hay and mangels and hay. Fields are rotationally grazed until well into December to cope with the flush of feed, after which the herd has free range over most of the farm. This practice has been found most satisfactory from the point of view of balancing the feed and avoiding clover bloat on these highly nitrogenous pastures. Last season 8 acres were saved for hay, and 13 acres for ensilage, the latter either in a concrete pit, or else a round stack is built. Each season either the pit, estimated to contain 90 tons, or the stack

Fig. 4.—Concrete pit which holds approximately 90 tons of silage.

of approximately 60 tons, is carried over, and thus provides against a sudden pasture shortage of production.

Important Factors.

A study of the methods employed by Mr. Blyde clearly emphasizes the importance of the utilization of the feed produced, and this in his case has been due to an appreciation of the value of subdivision and shelter, allied with a knowledge of the use of fertilizers. At

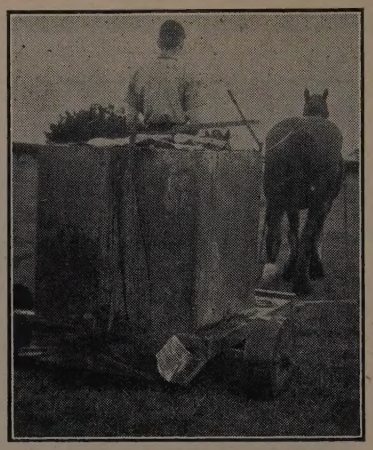

Fig. 5.—Spreading shed washings on pasture. The washings are pumped from a 500-gallon sump into the distributing-tank, which is shown above.

first glance the cost of top-dressing, which this year will be just over £2 per acre, appears high, but when it is realized that at present prices the gross return is in the vicinity of £18 per acre, the soundness of the practice becomes obvious. At the Lepperton factory cheese-making alternates with butter and casein production, home separation becoming necessary from May to July, while the per-acre-production figures quoted are obtained by dividing the total butterfat as paid for by the factory by 51, the total acreage of the farm including house and grounds and all shelter-belts.

No pigs are carried, and for herd replacements up to six calves are reared each year and sold as weaners, afterwards being bought in again as rising two-year-olds. The labour is provided by the farmer and one man, the latter lately replaced by a son of the owner, the use of efficient machinery and implements making it possible for these two to carry out all routine work except at harvest-time.

It is not suggested that production figures equal to those secured by this very successful farmer can be obtained on all dairying areas under similar conditions in North Taranaki, but Mr. Blyde's outstanding results indicate that it is possible to economically increase the present rather low per-acre butterfat-yields. The fact that improvements have been paid for out of income, and also that the farm winters and produces all feed required for stock on the area, indicates that good management must still be regarded as probably the most important factor in successful dairy-farming.

The history of the increased production over the years shows that no unusually unorthodox methods were employed, but that every advantage has been taken of the experience gained in the period, the per-pound cost of butterfat-production being lower than that of many other farms, while the per-acre production is probably almost twice that of many dairying districts. Farmers generally congratulate Mr. Blyde on his achievement, realizing that without attempting to create a record in production per acre he has undoubtedly improved his own financial position and provided others with valuable information which can at least in part be economically applied on many dairy-farms.

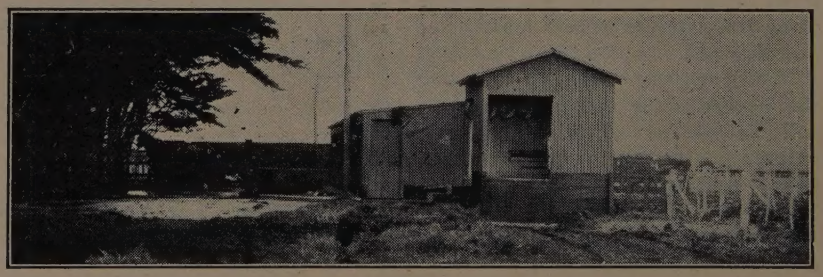

Fig. 6.—End view of milking-shed.

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Training of Boys at Flock House.

R. B. Tennent, Director of the Fields Division.

FLOCK House offers unrivalled opportunities for those numerous youths who have an inborn craving to go on the land, yet who, through force of circumstances, lack the opportunities of undertaking the initial steps of securing the training to fit them for a place on the farm.

Picture a group of fifty healthy young lads, ranging in age from 14½ years to 18 years, housed in what might well be described as an old-time manor, situated amidst some of the finest pastoral country of the Dominion; well fed, with ample communal activities, and receiving under ideal conditions a year's training in the essential practices pertaining to sheep and dairy farming, under the guidance of an expert staff of instructors. Such is Flock House.

Staff and boys at Flock House.

No charge is made for the training given at Flock House; in fact, a small sum for pocket-money is paid to the trainees, the only requirement being that the lads undertaking the course shall be of good health, of sound morality, and keen to learn something of the practices of farming.

The keenness shown by the Flock House lads is the best evidence that the course of training given is interesting and instructive, and when it is realized that the property embraces an acreage of over 8,000 acres, carrying more than 9,000 sheep and 150 milking-cows and 1,000 head of Polled Angus cattle, then it will be appreciated that ample opportunities are afforded to thoroughly train the lads in many phases of farming.

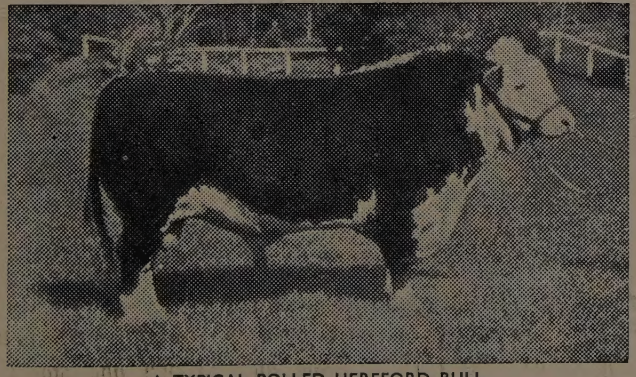
And what of the actual training itself? The boys are taught those essential things which every boy starting on a farm should know: The erection and straining of fences; harnessing horses, and their care; how to ride; milking, separating, and the use of milking-machines; drafting, dipping, and shearing sheep; vegetable and flower growing; ploughing, harrowing, mowing, and raking; the conservation of fodder, and growing of crops. Furthermore, and most important, they are taught to look after themselves, how to repair boots, mend their clothes, and, in general, to be independent of others.

Naturally a twelve months' training cannot make a boy, fresh from the town, proficient in all these phases of training, but it is remarkable how adaptable youth is, and how much when guided properly he will absorb and retain, and it is this fact which has led to Flock House lads being so eagerly sought after by prospective employers.

Their health is all-important, and this is well looked after by regulated work, good diet, and adequate recreation. Where these fail, the Matron of Flock House, who is a fully qualified nurse of long experience, is on hand to see that the boys are properly looked after.

As to the boy's future, this naturally is a matter largely for himself and his parents. On completion of the course, however, the boy is placed as an agricultural worker with an approved farmer so that his training can be continued under sound guidance. A regular and thorough follow-up system is in operation, so that every lad is visited once in three months by a Fields Division Instructor to see that everything is well with the lad and his training.

Free training to start him on the road to be a farmer—that is what Flock House offers the lads of New Zealand. Those interested should apply for full particulars to the Director of the Fields Division, Wellington.



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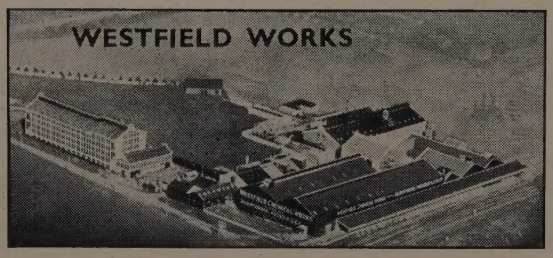

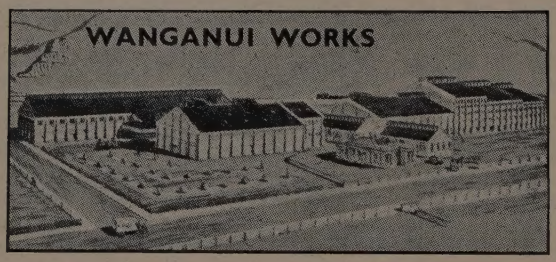

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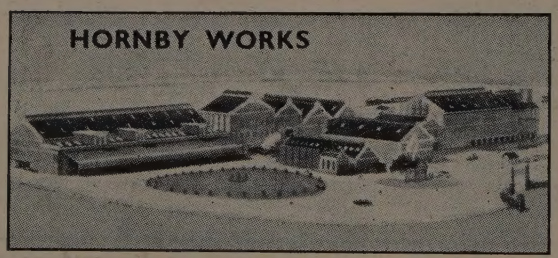

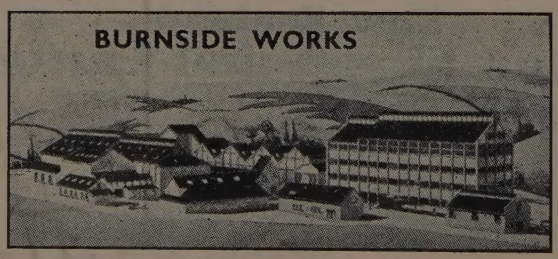

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Growing of Pampas-grass.

J. W. Woodcock, Crop Experimentalist, Fields Division.

Fig. 1.—Original plants dressed with super and unmoved.

THE possibilities of pampas-grass (*Cortaderia Sellcana*) as a supplementary fodder for cattle were first demonstrated by Mr. A. McClean, of Waitakaruru, and as a result of his methods being widely published by departmental officers a large number of farmers throughout the Dominion attempted to establish plantations of this species. Some have attained a considerable degree of success, and the amount of feed produced for wintering has led them to plant out further areas. Among others, however, there has been little appreciation of the exacting requirements necessary for the proper establishment of pampas-grass—a species which is often regarded as a weed in waste places—and as a result there has been a certain amount of disappointment among farmers who could not get satisfactory establishment.

Over one hundred and fifty farmers' plantations have been kept under observation by the Fields Division officers, and, in addition, two experiments were laid down in order to obtain data on the establishment and subsequent feeding-value of plants from different sources. Over half the number of farmers' plantations have been failures, and it is now evident that the establishment of pampas-grass is much more difficult in some districts and on some soil types than others. At times, even with sufficient care in planting, there has been lack of success due to such factors as frost damage, lack of fertility in the soil, or poor material for planting. The poor establishment on most of the South Island areas suggests that pampas-grass has a definite climatic range limited to the warmer and moister districts of the North Island. An analysis of the unsuccessful stands reveals the following points :—

(*a*) The low survival rate when propagation is attempted directly into the field from cuttings which have not previously been rooted in a nursery.

(*b*) The unsuitability of the plant for propagation in unprepared ground, especially when amongst bracken-fern and other roughage.

(*c*) The necessity for allowing plants to have a year or more's growth before grazing.

In short, pampas-grass must be regarded as a crop, and should be so treated if successful establishment is to be effected.

Fig. 2.—Transplants set in position where originals had not struck and where super was present.

The plant will not tolerate excessively dry or infertile conditions, and it is reasonable to suppose that a certain amount of intercultivation should be carried out in the early stages and that on poor soils at least a certain amount of fertilizer should be applied.

In connection with the manuring of pampas-grass plants it is of interest to describe the effect of fertilizer on some seedlings grown at the Ruakura Farm. At the end of June, 1935, seedlings were planted out and about one handful of superphosphate per plant was worked into the ground before planting. In the following September a number of these plants were removed and transplanted in other portions of the area, and representative plants as they appeared in early 1936 are shown in the photographs.

The plants in Fig. 3 were sparsely leaved, yellowish in colour, and only 2 ft. 6 in. in height, as compared with the dark green and leafy plants, 3 ft. 6 in. to 4 ft. in height, which had received superphosphate.

Material for planting out in the final location should be selected with care. Establishment by means of root-cuttings is a precarious method, and heavy plant-mortality has been experienced by farmers who have adopted it, particularly if the material has had to be obtained from any distance. The most efficient and least costly method is to obtain pampas-grass seedlings, and these should be started in a nursery on fairly fertile land. When the plants have become well rooted they should be put out into the plantation when all danger of frost is over on land that has been well prepared and, preferably, fertilized. If the soil between the rows can be cultivated, it will be a considerable help to establishment, and even if this is not practicable excessive weed-growth should be controlled. The stand should be adequately fenced, as indiscriminate grazing will rapidly kill out the plants.

There is a place for pampas-grass on many dairy-farms, particularly those on which the production of supplementary feed is difficult and a well-established plantation will be of considerable value. Many of the disappointing results secured by intending growers of pampas-grass have been due to lack of attention to the above points.

Fig. 3.—Transplants set in new positions where no super had been applied.

Role of Subterranean Clover.

Progress Review of Current Farm Surveys.

R. P. Connell, Land Utilization Officer, Palmerston North.

In farming, as in other matters, we have vogues. Whenever we have a vogue we may expect a certain amount of "following the vogue" in a somewhat blind manner unsupported by any prior comparable experience. This sometimes brings really good results, but sometimes quite poor results that often could have been anticipated. One of the latest outstanding vogues in farming has been that of subterranean clover, a vogue which has resulted in extensive sowings of subterranean clover, mainly in the central half of the Dominion—*i.e.*, the southern half of the North Island and the northern half of the South Island. In general this vogue has been a well-justified one, but it is likely, indeed practically certain, that a number of disappointing results will be associated with it. For instance, in one case subterranean clover was sown extensively on somewhat "raw" peaty soil on which apart from typical heath plants, including low bracken-fern, was to be found a small amount of sorrel and *Danthonia semi-annularis*. No past recorded New Zealand experience throws light on such a sowing, and, this being so, a small trial sowing would have been the prudent course.

In large parts of the South Island, because of the dry weather, the latter part of 1937 was unfavourable to good results with subterranean clover, and probably in the near future too much will be heard of any poor results due to the abnormal 1937 conditions, just as it is likely too much weight has been attached by some to the good results obtained in the unusually favourable two previous seasons.

Farming surveys in progress in both the North Island and the South Island have given useful information about subterranean clover.

Time of Sowing Important.

One fact of importance at this season is that a substantial number of the poor results, amounting at times to complete failures, of the past may be attributed to sowing at unsuitable dates. The results of field experience show that sowing in the spring, in the late autumn, or in the early winter cannot be recommended. On the other hand, sowing in late summer or early autumn, preferably before April, has in general given good results. An exception to this seems likely to be found in the case of districts having an early and severe winter—*e.g.*, the colder inland parts of Canterbury and North Otago, including the eastern foothills of the Southern Alps, in which sowing in January or even in December may be advisable. The objective in deciding the time of sowing should be to ensure that the young plants are well developed before frosts may be expected to set in. Spring sowing fails in respect to this objective because subterranean clover is an annual. Spring-sown plants often flower in the following autumn and early winter and, even if seed-production is not checked by frost, matured seeds tend to produce seedlings that do not make sufficient growth before the winter.

Depth of Sowing a Critical Factor.

As might be expected from a consideration of the relatively small size of subterranean-clover seed, the depth of sowing seed is an important factor in success. Quite frequently drilling the subterranean clover in with oats has given disappointing results, and this primarily because the bulk of the subterranean-clover seed was covered too deeply. Too deep sowing seems to occur readily also if the seed-bed is loose instead of well consolidated or if heavy harrows follow drilling, which, apart from the harrowing, would not lead to too deep sowing.

Amount of Seed Often too Small.

It often proves to be parsimony rather than true economy to use such small amounts of seed as 2 lb. an acre or less, yet in a recent South Island study of the practices adopted on 179 farms almost one-third of the subterranean-clover fields

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were the result of sowings of 2 lb. an acre or less. Small seedings have at times resulted eventually in dense swards of subterranean clover, but this has been only after such a considerable interval as to make it probable that greater net returns would have been obtained by having from the outset such a dense sward as may be expected from a suitably heavy sowing—say, in the vicinity of 4 lb. an acre—which calls for the outlay of only a few additional shillings per acre.

Influence of Companion Crops.

Sowing the subterranean clover with certain specific crops has regularly given poor results for divers reasons—drilling with oats, as already discussed, usually brings about too deep sowing of the subterranean clover; sowing with wheat means sowing at an unsuitable date, while sowing with rape or turnips is also likely to bring about sowing at an unsuitable date. Further, the feeding-off of turnips is frequently carried out at such a time and in such a manner that the subterranean clover is seriously checked—*e.g.*, winter feeding under wet conditions in "breaks" which are not fed off separately, the stock being allowed to run over all previous "breaks" at the same time as they are given access to a new "break."

Autumn Top-dressing Advisable.

In general in all districts top-dressing of subterranean-clover areas with superphosphate has proved decidedly advisable even in the case of districts in which such top-dressing of ordinary mixed permanent pastures has not as yet been shown to be economically attractive. Field experience points to the fact that in the exceptionally dry summer the effect of superphosphate may be poor or even adverse for that season, but in such circumstances the influence of the superphosphate may be expected to be largely deferred rather than lost, judging from the results in similar circumstances from top-dressing ordinary permanent pastures. In assessing the advisability of top-dressing subterranean clover the years of good and of average results from top-dressing must be set against the dry years of disappointing results, and if this is done it is considered that the balance will regularly be in favour of maintaining a top-dressing programme "through thick and thin." Early autumn top-dressing is recommended: it fosters the greater development of seedlings before the winter, and in suitably mild climates it gives additional feed from the subterranean clover during winter and early spring.

District Considerations.

Comparative field studies already made give much evidence that subterranean clover is fitted to play a valuable role in extensive areas in the drier eastern portion of the South Island, and particularly in the lighter parts of Canterbury and North Otago. The surveys in progress are not complete enough yet to indicate conclusively what part subterranean clover may play on more fertile soils in Canterbury and Otago on which red clover and white clover may be grown successfully. Neither has the role of subterranean clover on the foothill lands of Canterbury been determined, but it is interesting to note that subterranean clover has been established by surface sowing on brown-top-dominant grassland on foothill country. This conforms with limited experience in the Provinces of Wellington and Hawke's Bay and points to the advisability of exploring the matter further.

Because of climatic differences, it seems as if subterranean clover, useful indeed as it promises to be in the South Island, will not there be as spectacularly valuable as it has proved to be in parts of Hawke's Bay and Wellington. This is primarily because in the latter provinces in normal seasons subterranean clover proves of great value as a source of feed for use in winter and early spring—in the fall of the year rains are early enough and abundant enough and temperatures high enough to bring about a heavy and leafy growth of subterranean clover before the "dead of winter." In the drier, colder southern districts such a growth is not to be expected in a normally favourable season, and so in such districts subterranean clover cannot be given the special value that attaches to it in northern districts as a cheap winter-feed crop.

In conclusion, it is important to bear in mind that the survey work under review has not been completed, and hence the views expressed herein are necessarily tentative, and it may prove necessary later on to amend them.

Although the views are tentative they have whatever value that may be attached to them as reflecting the experience, usually short-term, on well over two hundred farms in the study of which a special effort has been made to give adequate consideration to the cases of failure with subterranean clover as well as to the cases of success about which there usually seems to be more ready mention.

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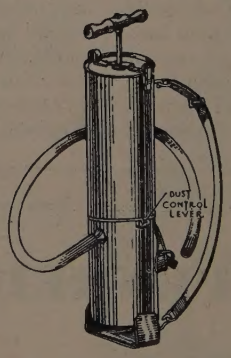

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W. T. Brown, Instructor in Agriculture, Hamilton.

WATER for stock is one of the first essentials on a farm, and many farms which are now insufficiently watered could greatly increase their production if an adequate supply were made available. Water for stock should be laid on to every field, with troughs of ample size to fulfil stock requirements. Concrete troughs of the type illustrated, common in many dairying districts, are probably the most useful for the purpose.

The material used in a trough holding 550 gallons consists of :—

¾ yard metal (crushed to ¾ in.).
½ yard sharp sand.
3½ bags of cement.

The boxing is made of six bent sheets of corrugated iron (three for the inside and three for the outside) fitted together by small galvanized screw bolts and washers. To facilitate easy removal the boxing is painted with a clay wash or waste oil. Galvanized wire netting and No. 8 fencing wire makes very efficient reinforcing.

The aggregate (shingle and sand) and cement are thoroughly mixed (at least three times) before any water is added. Repeat the mixing and, by carefully splashing or spraying through a watering-can over the new heap being formed add the water, until the mixture has reached the desired state of wetness. Excess water should be avoided, as a large amount of concrete may be lost in the water escaping from the heap.

Fig. 2.—Illustrates a concrete trough placed in a rail fence of a cowyard. This supplies adequate water, and the fence prevents cows milling round the trough.

A good foundation is necessary. The ground on which the trough is to stand should be excavated to a depth of 4 in. to 6 in. below the level intended for the lower side of the trough bottom, and a foot wider all round the trough should be well consolidated and covered with a layer of course shingle, rammed into a compact bed.

The outer frame is placed in position and 4 in. of concrete laid to form the bottom of the trough and the reinforcing for the sides is let into the floor of the trough. When this has set sufficiently the inside boxing is carefully placed in position. Small blocks 4 in. by 2 in. are used to regulate the distance between the two frames, and as the concrete is worked into the walls these are gradually lifted.

A smooth finely finished surface can be acquired by rubbing the surface of the concrete with a wooden float, which is continually dipped in a cement wash. If the desired result is not obtained by this method, a finishing coat of one part cement to two parts sand is applied and finished off with a float. For the corrugated sides a float is cut to fit into the corrugations, and for best results the floating should be done within twenty-four hours after the removal of the boxing. Keeping the structure damp for several weeks assists the concrete in maturing. (Slow maturing imparts greater strength to the structure.) Do not admit more than an inch of water to the trough for several weeks.

Fig. 1.—Shows the position of the trough in a fence-line, enabling two fields to be supplied.

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Growing of Onions for Seed.

A. V. Allo, Instructor in Agriculture, Christchurch.

In the early stages of onion-growing, seed was brought from England, and crops were very light in comparison with those now grown. Onions produced from English seed were never satisfactory, containing many thick necks irrespective of seasonal conditions.

Of recent years some crops sown with reputedly English seed have proved satisfactory, but it is understood that although the seed originally came from England it was actually grown in Australia. Departmental experience has shown that either New Zealand or Australian seen must be sown to secure a satisfactory crop, as English-grown seed almost invariably produces thick necks, and even Australian seed does not always produce very satisfactory crops.

Onion-flowers are cross-pollinated, and where two or more varieties are grown in close proximity it is usually found that some of the bulbs grown from the seed produced show characteristics of both varieties, proving that crossing has taken place. This is the reason why so many of our commercial onion crops show a lack of uniformity of type. Growers who have a good strain of onion which they desire to keep pure must have their seed grown in a district isolated as far as possible from any other onion crops. The main seed-producing areas in New Zealand are Auckland, North Canterbury, Central Otago, and Marlborough.

For a seed crop the best bulbs available should be planted, these being selected for trueness to type, shape, and quality. Thus the cream of the onion crop is usually kept for seed.

Bulbs are planted 18 in. apart in rows 3 ft. apart in well-worked ground in the autumn and winter in most districts, although in a district such as Central Otago, subject to severe winter frosts, planting takes place in the early spring. The ground should be kept well worked and weeded during growth. Sometimes the seed plots are sprayed with Bordeaux or Burgundy mixture (3–4–50) in an endeavour to check mildew, which disease if severe will retard and destroy the growth of the leaves and seed stems. Near the sea-coast there is less chance of this disease developing, and this explains the popularity of the coastal districts of Auckland and Marlborough for onion-seed production.

As the seed-heads ripen they are cut short and placed on canvas sheets in the sun to dry. In rainy weather and at night the canvas is folded up and seed carried under cover. The drying of the heads and the threshing of the seed may be a very protracted business in showery summers and autumns, entailing much tedious work in this direction. When the seed is threshed out and dried hard, it is collected and thrown into a bucket of water. The light seed, which is of poor vitality and low germination, and the dust float on the top of the water, while the best seed sinks to the bottom of the bucket and is separated. Light seed will produce only poor yields, and is discarded. The good seed is dried, and is ready for sale.

Yields of seed vary greatly from season to season. Some crops have been known to give over 1,000 lb. of seed per acre, others only 50 lb. per acre. If the harvesting period is wet and windy, yields are low, for only in dry summers do heavy yields obtain.

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Agricultural Regulations.

New-Zealand-grown Fruit.

A. E. Morrison, Solicitor, Department of Agriculture.

THE New-Zealand-grown Fruit Regulations 1938, which came into force on 28th March, follow in the main the old regulations under the Orchard and Garden Diseases Act, 1928, relating to the sale of New-Zealand-grown fruit, but, whereas under the revoked regulations grading is optional except in the case of cured lemons, under the new regulations the grading of apples, pears, and lemons (whether cured or not cured) for sale for local consumption is now compulsory.

With regard to the standard types of packages for fruit, apricots, nectarines, peaches, or plums may, in addition to the types of packages hitherto prescribed for such fruit, now be packed in package No. 6—*i.e.*, 7 in. by 7 in. by 18 in.—if the net weight of the fruit is branded on the package; while, in addition to the types of packages hitherto prescribed for tomatoes, this fruit may now be packed in package No. 7—*i.e.*, 6 in. by 9 in. by 11 in.

With respect to the branding of packages of fruit for sale, the registered mark of the owner of the fruit, his name and address, and the variety, grade, and count of the fruit must be branded on each package. If the name of the variety of fruit is unknown, the words "variety unknown" must be branded on each package. Packages containing lemons of the Meyer variety must bear the name of that variety; and all packages containing lemons must bear the word "cured" or the words "not cured," as the case may require. Where fruit is sold direct to a factory for processing into any fruit product the registered mark of the owner of the fruit only is required to be borne on each package. Where fruit is sold direct to a consumer or retailer in unlidded cases, the owner's registered mark and the variety and grade of the fruit only are required to be borne on each package. Where Orchard Run grade or Minimum grade apples or pears or Small grade lemons are packed as a jumble pack, the words "not sized" must be branded on the package instead of the count of the fruit in the package. Packages containing Commercial B grade apples or containing Commercial grade pears free from black-spot may be branded with the words "no black-spot." A shipping or other forwarding mark may be branded on any package of fruit. The particulars to be branded on packages of fruit must be branded in the respective positions laid down in the regulations on one end only of the package and in such manner that no prescribed particulars are concealed or obscured. Suitable labels containing the prescribed particulars may be used for affixing to packages of fruit.

The grades for apples are Extra Fancy, Fancy, Commercial A, Commercial B, Orchard Run, and Minimum grade; for pears, Extra Fancy, Fancy, Commercial, Orchard Run, and Minimum grade; while for lemons the grades are Extra Fancy, Fancy, Good, and Small grade.

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All graded fruit except Minimum grade apples or pears must be wrapped. The wrapping of fruit is optional in the following cases :—

(*a*) Extra Fancy and Fancy grade fruit when sold for delivery only in the provincial district where grown.

(*b*) Any cooking varieties of apples or pears when packed from the trees in a hard, green condition.

(*c*) Any grade of fruit except Extra Fancy and Fancy, having regard to its maturity at the time of packing and the mode and condition of transport to the place of sale.

Orchard Run grade or Minimum grade apples or pears or Small grade lemons may be packed as a jumble pack, but no fruit shall be included in a package which is of less size than the minimum size prescribed. All graded fruit except Orchard Run and Minimum grade fruit may be placed in cool store prior to sale. Before removal from cool store such graded fruit must be examined for the purpose of ascertaining whether the contents of any package have been affected by storage defects and either branded with the words " ex cool store " or re-sorted and repacked so as to exclude fruit affected by storage defects. Where fruit has been re-sorted and packed so as to exclude fruit affected by storage defects, the packages may be branded with the word " repacked " in addition to the words " ex cool store."

With respect to the inspection and examination of graded fruit, the provisions of the revoked regulations are re-enacted with the following modifications : Any package containing Minimum grade apples or pears or Small grade lemons found on inspection to be below that standard may, at the option of the owner, be either re-sorted and repacked so as to conform to the grade mark on the package or sold only to a factory for processing into any fruit product or for a purpose other than human consumption. If the contents of any package containing Orchard Run grade fruit are found to be materially at variance with the standard prescribed for that grade, and the lowest grade of the fruit cannot reasonably be determined, such fruit may similarly be either re-sorted and repacked so as to conform with one or other of the grades prescribed or sold only for processing into any fruit product or for a purpose other than human consumption. Any line of fruit in packages branded " ex cool store " the contents of which are noticeably and to the detriment of a purchaser affected by storage defects may similarly be either re-sorted and repacked so as to exclude all fruit so affected or sold only for processing into any fruit product or for a purpose other than human consumption. Where, on re-sorting and repacking, any fruit is discarded as being affected by storage defects, the discarded fruit may similarly be either sold only for processing into any fruit product or for a purpose other than human consumption.

An inspection fee is imposed on all graded fruit—viz., apples, pears, and lemons—sold in the Dominion to reimburse the Department for the additional cost involved in carrying out the necessary inspection service to ensure that fruit is sold according to grade. The fee is recoverable by means of special stamps to be affixed to packages of fruit before sale. The amount of the fee is 1d. for each standard bushel package and ½d. for any other type of package.

The sale is prohibited of any fruit in packages unless all the requirements of the regulations have been complied with, or of any graded fruit unless all the provisions relating to the grading, wrapping, and packing of fruit and the stamping or marking of packages have been complied with.

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The Share-milking Agreements Act.

THE purpose of this statute, which came into force on 15th March, 1938, and which is administered by the Labour Department, is to make provision for safeguarding the interests of share-milkers under share-milking agreements. The terms and conditions of every share-milking agreement made between a share-milker and an employer who owns or provides the dairy herd (whether the agreement has been entered into before or after the coming into force of the Act) shall operate on and after 1st August next not less favourably to the share-milker than the standard terms and conditions agreed to on behalf of the New Zealand Farmers' Union and the New Zealand Workers' Industrial Union of Workers and set forth in the Schedule to the Act. Where any such share-milking agreement contains terms and conditions inconsistent with the standard terms and conditions prescribed by the Act, the inconsistent terms and conditions shall, on and after 1st August next, be deemed to be null and void in so far as they would operate to the disadvantage of the share-milker.

The standard terms and conditions may be altered, varied, revoked, or new terms and conditions added by the Governor-General in Council if satisfied that the proposed alterations, variations, or additions have been agreed to on behalf of the organizations mentioned above or on behalf of organizations representing the interests of share-milkers and farmers. The provisions applicable to the class of agreement referred to may be applied to other classes of share-milking agreements by the Governor-General in Council upon being satisfied that the agreements contain standard terms agreed on by representative organizations of employers and share-milkers.

An Inspector may take proceedings on behalf of a share-milker under any share-milking agreement without limiting in any way the remedies the share-milker may have against his employer, and a share-milking agreement which is not to be performed within the space of one year shall be enforceable in any Court of competent jurisdiction notwithstanding that the agreement has not been committed to writing.

Terms and Conditions.

The Schedule contains some thirty-nine standard terms and conditions (applicable, as already stated, only where the employer owns or provides the dairy-shed), of which the following are perhaps the most important :—

(*a*) A share-milker is entitled to see the previous year's production figures before entering into any agreement.

(*b*) A share-milker whose duties comprise only milking and the care and feeding of stock, including pigs, shall receive not less than 25 per cent. of the milk and cream cheques and deferred payments, but where maintenance work is included he must receive not less than 33⅓ per cent. after deduction, in either case, of cartage costs of milk and cream. Unless otherwise mutually agreed upon, a share-milker shall not contribute towards the payment of shares or receive any benefit from the share bonus.

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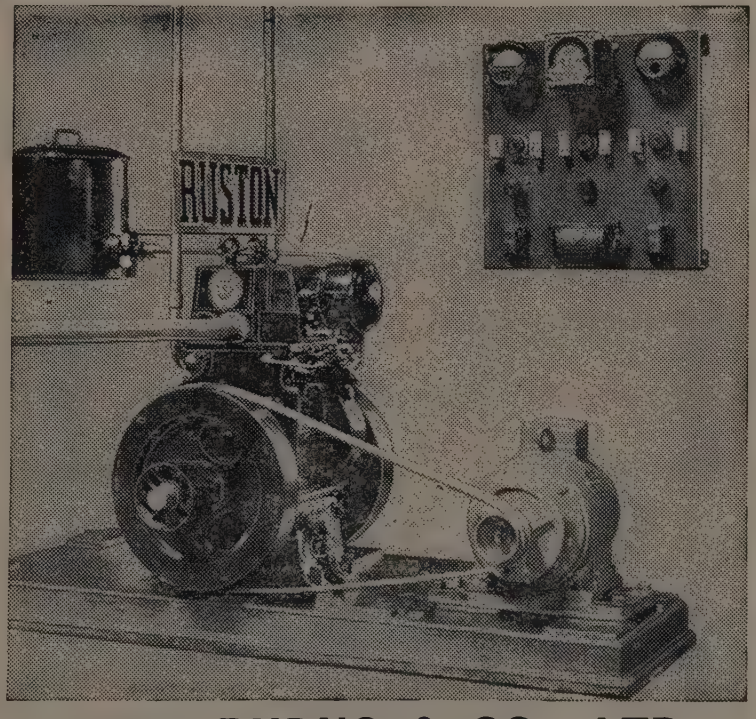

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(*c*) A share-milker must receive half-share of the value of calves valued as grades (including bobby calves) and pigs.

(*d*) All rubberware must be in a satisfactory condition at the commencement of the agreement, and the share-milker must leave it in that condition on the termination of the agreement.

(*e*) The employer shall have the right to determine which company or factory shall be supplied, and whether milk or cream is to be supplied.

(*f*) The employer must pay for all herd-testing, including the herd-tester's board.

(*g*) A share-milker must bear his proportion of deductions in connection with the grading of milk and cream, except in cases of his neglect, when he must bear the whole of the deductions.

(*h*) Within three days of its receipt, the employer must pay the share-milker's share of the milk or cream cheque direct into the share-milker's banking account or to him personally. In either case a copy of the monthly statement must be supplied to the share-milker.

(*j*) In the event of a dispute arising out of any of the terms of the agreement, each party must appoint an arbitrator to decide the matter in difference, but if the arbitrators are unable to agree they must appoint a third party, whose decision shall be final.

Persons interested are advised that a copy of the Act may be obtained on application to the Government Printer, Wellington, price 6d., plus postage.

Statutes Amendment Act, 1937.

BY section 3 of the Statutes Amendment Act, 1937, which came into force on 15th March, 1938, any agricultural worker employed on a dairy-farm may agree with his employer to accept leave from work between milkings on one day in each week instead of a half-holiday as prescribed by section 15 of the Agricultural Workers Act, 1936. If leave is allowed, it is deemed equivalent to the half-holiday prescribed by that section.

By section 25 of the Statutes Amendment Act, agricultural tractors—that is to say, tractors which are used exclusively for agricultural purposes and which are not used on any road or street except when proceeding to or from a farm—are exempt from payment of registration fees. Trailers which are drawn or propelled exclusively by agricultural tractors are similarly exempt.

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Testing of Purebred Dairy Cows.

Review of the New Zealand Certificate-of-Record System in 1937.

W. M. Singleton, Director of the Dairy Division, Wellington.

ENTRIES for certificate-of-record test seem to have reached a more or less stable position, and the number of certificated cows varies little from year to year. During the calendar year 1937 first-class certificates of record were issued to 554 cows, as compared with 534 cows in 1936, 494 cows being in the yearly test division, and the remaining 60 in the 305-day division, the comparative figures for 1936 being 490 and 44 respectively.

(1) C.O.R. YEARLY TEST DIVISION.

The average butterfat yield represented by the 494 certificates issued during the year was 512·68 lb., an increase of 3·68 lb. over the average of 509·00 lb. fat for the 490 certificates granted in 1936.

First-class Certificates issued.

Under this heading the ten thousand mark has now been passed, the number of cows gaining first-class certificates to the end of the calendar year 1937 being 10,307. This position has been achieved in twenty-five years, the C.O.R. system having been inaugurated in 1912, and represents an average of 412 certificates a year. Subdividing the total into breeds, there were 7,682 Jerseys, 1,856 Friesians, 467 Milking Shorthorns, 223 Ayrshires, 69 Red Polls, 2 Guernseys, and 8 Shorthorns. Needless to say, many cows have been tested more than once, and certificates issued during the twenty-five years total 11,793. Of these, 8,621 went to Jerseys, 2,302 to Friesians, 516 to Milking Shorthorns, 250 to Ayrshires, 94 to Red Polls, 8 to Shorthorns, and 2 to Guernseys. Table 1 provides a numerical summary of yearly certificates of the first class issued during the past two calendar years :—

Table 1.

Breed.	1937.			1936.		
	Ordinary.	Repeat.	Total.	Ordinary.	Repeat.	Total.
Jersey	385	44	429	383	35	418
Friesian	49	8	57	43	13	56
Milking Shorthorn	5	1	6	9	2	11
Ayrshire.. ..	1	..	..	3	..	4
Shorthorn ..	..	..	..	..	..	..
Red Poll ..	..	1	1	1	..	1
Totals ..	440	54	494	439	51	490

Second-class Certificates issued.

In 1932, at the request of breeders, through the New Zealand Dairy Breeds Federation, a third-class certificate was introduced, eligibility for this certificate consisting of qualification for first or second class certificate in all respects save period between calving for commencement of test and calving subsequent to test. In 1936, by request from the same organization, the class was withdrawn, and since the 1st January, 1937, only two classes have been recognized, the second and third classes being combined under the heading of second class, and embracing all cows which qualify for first-class certificates except in respect of the subsequent calving requirement. To bring about a satisfactory recording and working basis, all third-class certificates have been withdrawn and second-class certificates issued in their stead.

Second-class certificates granted during the calendar year 1937 totalled 101, and of these, 80 were gained by Jerseys, 14 by Friesians, 6 by Milking Shorthorns, and 1 by an Ayrshire. The previous year's total (combining second and third class) was 77, of which 30 were issued in the second class and 47 in the third.

Period between Calvings.

The rules for first-class certificate require that the period between calving for commencement of test and calving subsequent to test shall not exceed 455 days. The average period between these calvings for the 494 cows granted first-class certificates in 1937 was 401 days, as compared with 400 days for 490 cows in 1936. It will therefore be seen that the average cow calved approximately eight weeks within the time allowed.

Jerseys.

Class Leaders.

Although only one Jersey class leadership was changed, several excellent Jersey records were completed during the year. The change of leaders occurred in the senior two-year-old class, Mr. P. J. Petersen's Ivondale Golden Rainbow, with 768·46 lb. fat, giving way to Punga Nui Joyce, bred and tested by Mr. D. Yandle, of Te Wera, Taranaki. This outstanding young cow is already leader of Junior Two-year-old Jerseys in the 305 day division, while her last year's performance now gives her the Senior two-year-old class leadership in both the 365 and 305 day divisions of the C.O.R. test. As will be noted from the tables which follow, she yielded 690·13 lb. fat in 305 days and 794·65 lb. fat in 365 days.

Credit for the highest first-class C.O.R. Jersey for the year goes to Coniston Goldie, owned and tested by Mr. R. Waterhouse, of Takanini, Auckland. Commencing test at the age of 7 years 351 days, she gained a certificate for 885·46 lb. fat from 13,208·7 lb. milk in 365 days. Coniston Goldie was at one time leader of the Junior Two-year-old Jerseys on her record of 742·71 lb. fat. Her latest performance, commenced at practically eight years, indicates that she has constitution as well as productive ability to an outstanding degree.

A third Jersey deserving special mention is Meon Kismet, owned by Mr. R. Fleming, of Waimana, Bay of Plenty. She commenced test at the age of 6 years 33 days, and in 365 days yielded 13,939·7 lb. milk containing 954·41 lb. fat. This was the highest butterfat record for the year for all breeds, but, unfortunately, was only a second-class C.O.R.

Coniston Goldie. (Owner: R. Waterhouse, Takanini.) Highest First-class C.O.R. Jersey, 1937.

Age, 7 years 351 days; days in milk, 365; milk, 13,208·7 lb.; fat, 885·46 lb.

This cow has been a consistent producer under C.O.R. test, her other records being—First-class C.O.R.: 742·71 lb. fat as a junior two-year old; first-class C.O.R.: 918·96 lb. fat as a mature cow.

The present Jersey class leaders are as follows :—

Table 2.

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat required for Certificate.	Yield for Season.		
				Days.	Milk.	Butter-fat.
Junior Two-year-old.		Yrs. dys	lb.		lb.	lb.
Beechlands Summer Lass	A. Moreland and Sons, Te Rapa	1 343	275·5	365	15,467·2	899·25
Senior Two-year-old.						
Punga Nui Joyce ..	D. Yandle, Te Wera	2 337	309·2	365	13·216·9	794·65
Three-year-old.						
Ivondale Silver Rainbow	P. J. Petersen, Waitara	3 327	309·7	365	15,073·4	950·63
Four-year-old.						
Woodlands Felicie	P. J. Petersen, Waitara	4 364	384·9	365	17,332·6	1,220·89
Mature.						
Holly Oak's Annie	W. T. Williams, Pukehou	5 9	350·0	365	18,522·7	1,056·49

Meon Kismet. (Owner: R. Fleming, Waimana.)

Age, 6 years 33 days; days in milk, 365; milk, 13,939·7 lb.; fat, 954·41 lb. Second-class C.O.R.

"Exporter" photo.

Punga Nui Joyce. (Owner: D. Yandle, Te Wera.)

New class leader, Senior two-year-old division of both the 305-day and 365-day tests.

"Exporter" photo.

Jersey Class Averages.

In 1937 Jersey cows received 429 certificates in the yearly division as compared with 418 in 1936. The 429 certificates represented an average production of 506·83 lb. fat, the average for the previous year being 505·13 lb. fat. The averages class by class for 1937 and 1936 are given in table 3 :—

Table 3.

Class.	Number of Cows.	Average Yield for Season.		
		Days in Milk.	Milk.	Butterfat.
1937.			lb.	lb.
Junior two-year-old	180	348	7,876·0	457·67
Senior two-year-old	55	357	8,243·8	482·29
Three-year-old	59	348	8,929·2	514·90
Four-year-old	38	353	10,092·8	574·58
Mature	97	347	10,363·0	580·53
1936.				
Junior two-year-old	167	354	7,873·6	449·11
Senior two-year-old	40	345	7,862·1	452·47
Three-year-old	64	359	9,305·0	522·75
Four-year-old	54	354	10,084·2	575·91
Mature	93	354	10,283·4	575·12

The averages, class by class, of all certificates issued to Jersey cows since the commencement of the C.O.R. system in 1912 are given in Table 4 :—

Table 4.

Class.	Number of Certificates	Average Yield for Season.		
		Days in Milk.	Milk.	Butterfat.
			lb.	lb.
Junior two-year-old	3,460	349	7,298·8	411·82
Senior two-year-old	921	347	7,945·0	450·17
Three-year-old	1,276	347	8,716·2	488·53
Four-year-old	891	348	9,320·0	522·09
Mature	2,073	347	9,634·2	531·16
All	8,621	348	8,348·1	467·36
Average test, 5·59.				

Jersey C.O.R. Bulls.

The Jersey cows which have received certificates to date are from 2,786 different sires, and of this number, 567 have qualified for the C.O.R. bull class. A bull is classified as a C.O.R. bull when he has four or more daughters with first-class certificates, each daughter being from a different dam. Forty-six bulls have now qualified for the Jersey Cattle Breeders' Association's Champion butterfat bull (C.B.B.) class, the qualifications for this class being as follows: Each bull must have five or more daughters which under first-class C.O.R. conditions have produced 520 lb. butterfat when starting test up to three years of age, 580 lb. when starting between three and four years of age, 640 lb. when starting between five years of age, or 700 lb. when five years old or over. It is not necessary for each daughter to be from a different dam. The corresponding standards for cows in the 305-day test are 460 lb., 510 lb., 560 lb., and 620 lb. butterfat, respectively.

Friesians.

Class Leaders.

The past year's testing brought no changes to the Friesian class leaders. There were, however, some excellent performances. The highest first-class C.O.R. Friesian for 1937 was Glendale Dutch Ashburn 2nd, owned by A. W. Montgomerie, of Mangere. This cow commenced test at the age of 4 years 78 days, and in 365 days yielded 842·01 lb. fat from 21,131·4 lb. milk.

The highest performer of the breed for the year, however, was Lelburne Princess Mandella Pride, owned by Messrs. A. and R. Udy, of Menzies Ferry, Southland. This cow failed by only 22 days to calve in time for first-class certificate. She was granted a second-class C.O.R. on a yield of 905·72 lb. fat from 20,088·1 lb. milk on a test commenced at the age of 8 years 18 days.

The Friesian class leaders are as follows:—

Table 5.

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat required for Certificate.	Yield for Season.		
				Days.	Milk.	Butter-fat.
		Yrs. dys	lb.		lb.	lb.
Junior Two-year-old.						
Monavale Queen Bess	T. H. Richards, Cardiff	2 16	242·1	365	20,501·1	740·50
Senior Two-year-old.						
Pareora Echo Blossom	T. Sheriff, Clandeboye	2 223	262·8	365	22,671·9	819·81
Junior Three-year-old.						
Monavale Queen Bess	T. H. Richards, Cardiff	3 56	282·6	365	21,609·3	800·18
Senior Three-year-old.						
Totara C.R. Buttercup	Piri Land Co., Auckland	3 247	336·7	365	25,885·3	989·10
Junior Four-year-old.						
Totara Veeman Lulu	Piri Land Co., Auckland	4 12	349·7	365	22,364·2	946·78
Senior Four-year-old.						
Totara C.R. Buttercup	Piri Land Co., Auckland	4 267	375·2	365	27,108·1	1,079·14
Mature.						
Alcartra Clothilde Pietje	Vernon Marx, Mangatoki	7 355	350·0	365	31,312·5	1,145·24

Friesian Class Averages.

Friesian cows in the yearly division received 57 certificates, this number being one more than for 1936. The average production for 1937 was 559·46 lb. fat, in comparison with 561·50 for the previous year. The Friesian class averages for 1937 and 1936 are given in Table 6:—

Table 6.

Class.	Number of Cows.	Average Yield for Season.		
		Days in Milk.	Milk.	Butterfat.
			lb.	lb.
1937.				
Junior two-year-old	18	363	14,203·0	513·36
Senior two-year-old	9	346	13,675·4	499·66
Junior three-year-old	3	365	13,521·5	499·34
Senior three-year-old	7	349	16,484·9	593·49
Junior four-year-old	4	349	17,821·6	653·48
Senior four-year-old	3	346	17,825·8	597·98
Mature	13	355	17,284·4	622·39
1936.				
Junior two-year-old	20	351	13,240·8	459·98
Senior two-year-old	5	359	14,510·3	499·81
Junior three-year-old	5	365	14,937·2	575·51
Senior three-year-old	3	333	15,237·3	562·21
Junior four-year-old	2	353	15,379·0	620·71
Senior four-year-old	6	330	16,553·9	561·04
Mature	15	361	18,784·3	704·88

Glendale Dutch Ashburn 2nd. (Owner: A. W. Montgomerie, Mangere.) Highest first-class C.O.R. Friesian record, 1937.
Age, 4 years 78 days; days in milk, 365; milk, 21,131·4 lb.; fat, 842·01 lb.

The averages, class by class, of all certificates issued to Friesian cows since the commencement of the C.O.R. system in 1912 are given in the following table:—

Table 7.

Class.	Number of Certificates.	Average Yield for Season.		
		Days in Milk.	Milk.	Butterfat.
			lb.	lb.
Junior two-year-old	694	347	12,037·9	427·79
Senior two-year-old	285	348	12,879·4	459·17
Junior three-year-old	201	344	13,617·6	482·16
Senior three-year-old	207	337	14,276·3	511·79
Junior four-year-old	143	345	15,403·7	546·82
Senior four-year-old	146	346	16,275·0	569·11
Mature	626	343	16,263·0	575·00
All	2,302	345	14,108·1	500·37

Average test, 3·54.

Friesian C.O.R. Bulls.

Three new names were added to the Friesian C.O.R. bull list during the year, the total for the breed now being 126. Some 671 sires are represented in the 1,895 Friesian cows (including the 305-day division) certificated to the end of 1937.

Lelburne Princess Mandella Pride. (Owners: Messrs. A. and R. Udy, Menzies Ferry.) Second-class C.O.R., 905·72 lb. fat.

Days in milk, 365; milk, 20,088·1 lb.; age, 8 years 18 days.

Milking Shorthorns.

Class Leaders.

No changes took place in the Milking Shorthorn class leaders during the year. The highest performance of the year for the breed was that of Allandale Lady Clare, bred and tested by Messrs. R. S. Allan and Sons, of Hatuma, Hawke's Bay. She gained a first-class certificate for 727·82 lb. fat from 18,709·2 lb. milk in 365 days on a test commenced at the age of 5 years 54 days. Allandale Lady Clare already has a certificate in the senior three-year-old class for the excellent production of 705·93 lb. fat from 17,147·1 lb. milk.

The Milking Shorthorn class leaders are as follows:—

Table 8.

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat required for Certificate.	Yield for Season.		
				Days.	Milk.	Butter-fat.
		Yrs. dys	lb.		lb.	lb.
Junior Two-year-old.						
Matangi Quality 4th	Ranstead Bros., Matangi	2 109	251·4	365	14,572·8	591·89
Senior Two-year-old.						
Pinedale Beauty 4th	G. D. Hall and Son, Otoro-hanga	2 362	311·7	365	13,273·0	580·62
Junior Three-year-old.						
Marangi Quality 4th	Ranstead Bros., Matangi	3 153	292·3	365	16,281·4	678·02
Senior Three-year-old.						
Matangi Ruth 2nd ..	Ranstead Bros., Matangi	3 304	307·4	365	14,032·7	747·86
Junior Four-year-old.						
Matangi Matilda 4th	Hon. Mrs. E. J. Blyth, Kohi-marama	4 0	313·5	358	14,640·2	630·38
Senior Four-year-old.						
Ashley Bank Winsome	Peach Bros., Sefton	4 298	378·3	365	17,687·7	730·93
Mature.						
Glenthorpe Lady ..	A. J. Melville, Buckland	Mature	350·0	365	20,136·2	856·85

Milking Shorthorn Class Averages.

The six milking shorthorns certificated in 1937 were credited with an average production of 534·45 lb. fat from 13,045·1 lb. milk in an average lactation period of 324 days. One cow was in the senior three-year-old class, one in the senior four-year-old, while the remaining four were mature. The eleven cows of the breed granted certificates during the previous year averaged 456·44 lb. fat from 10,880·7 lb. milk.

Allandale Lady Clare. (Owners: R. S. Allan and Sons, Hatuma, Hawke's Bay.) Highest C.O.R. Milking Shorthorn, 1937.

Age, 5 years 54 days; days in milk, 365; milk, 18,709·2 lb.; fat, 727·82 lb.

The averages, class by class, of all certificates issued to Milking Shorthorn cows since the commencement of C.O.R. testing for this breed in 1914 are given in the following table:—

Table 9.

Class.	Number of Certificates.	Average Yield for Season.		
		Days in Milk.	Milk.	Butterfat.
			lb.	lb.
Junior two-year-old	58	349	8,406·2	346·25
Senior two-year-old	46	350	9,020·3	376·83
Junior three-year-old ..	29	337	9,750·7	398·70
Senior three-year-old	33	341	10,931·2	454·16
Junior four-year-old	26	350	11,097·5	454·38
Senior four-year-old	35	342	11,523·7	461·40
Mature	289	342	11,866·4	475·32
All	516	343	10,983·1	444·37

Average test, 4·04.

Milking Shorthorn C.O.R. Bulls.

Milking Shorthorn C.O.R. bulls remain at sixteen, no new names having been added during the year. A total of 158 sires is represented in the 469 cows of this breed certificated to the end of 1937.

Ayrshires.

Class Leaders.

Only one Ayrshire qualified for first-class certificate in 1937. Her production did not affect the class-leadership position, which is as follows:—

Table 10.

Name of Cow and Class.	Tested by	Age at Start of Test	Fat required for Certificate	Yield for Season.		
				Days.	Milk.	Butter-fat.
		Yrs dys.	lb.		lb.	lb.
Two-year-old.						
Fair Maid of Green-bank	W. Moore, Homebush	2 27	243·2	365	12,281·3	673·56
Three-year-old.						
Maesgwyn Victoria ..	C. Morgan Wil-liams, Kaiapoi	3 250	302·0	365	16,507·7	646·98
Four-year-old.						
Ivanhoe Fancy ..	A. M. Weir, Menzies Ferry	4 308	344·3	365	14,207·7	713·93
Mature.						
Floss of Braeside ..	W. Moore, Homebush	7 287	350·0	365	20,305·5	832·72

Ayrshire Class Averages.

The averages, class by class, for all certificates issued to Ayrshire cows since the commencement of C.O.R. testing in 1912 are given in the following table :—

Table 11.

Class.	Number of Certificates.	Average Yield for Season.		
		Days in Milk.	Milk.	Butterfat.
			lb.	lb.
Two-year-old	73	344	8,958·9	372·13
Three-year-old	40	347	10,028·0	413·26
Four-year-old	27	346	11,378·0	459·52
Mature	110	348	11,942·9	485·96
All	250	347	10,704·2	438·23
Average test, 4·09.				

Ayrshire C.O.R. Bulls.

The Ayrshire C.O.R. bull list was not altered as the result of the year's testing. The total is 13, while 126 sires are represented in the 227 Ayrshire cows (including the 305-day division) certificated to the end of 1937.

Red Polls.

Only one cow of the Red Poll breed qualified for first-class C.O.R. during the year, this cow being in the three-year-old class. The class-leadership list remains unchanged, and is as follows :—

Table 12.

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat required for Certificate.	Yield for Season.		
				Days.	Milk.	Butterfat.
Two-year-old.		Yrs. dys	lb.		lb.	lb.
Wayward 6th B No. 1	G. S. Young, West Plains	2 188	259·3	365	11,228·0	511·42
Three-year-old.						
Dominion Gold Top ..	Central Development Farm, Weraroa	3 302	307·2	365	9,491·25	459·46
Four-year-old.						
Wayward 6th B No. 1	G. S. Young, West Plains	4 297	343·2	365	13,290·0	580·05
Mature.						
Waihou Pip ..	W. Jackson, Waihou	7 25	385·0	365	12,681·8	537·90

Red Poll Class Averages.

The averages, class by class, for all certificates issued to Red Poll cows since the commencement of C.O.R. testing for this breed in 1918 are as follows :—

Table 13.

Class.	Number of Certificates	Average Yield for Season.		
		Days in Milk.	Milk.	Butterfat.
			lb.	lb.
Two-year-old	43	345	7,575·7	336·72
Three-year-old	17	345	7,920·3	349·95
Four-year-old	8	349	9,806·8	430·72
Mature	26	341	10,501·0	443·67
All	94	344	8,637·0	376·70
Average test, 4·36.				

Red Poll C.O.R. Bulls.

No new names were added to the Red Poll C.O.R. bull list during the year. Twenty-eight different sires are represented in the seventy cows of the breed (including one in the 305-day division) certificated to date.

(2) C.O.R. 305-DAY TEST DIVISION.

There was an increase in the number of cows submitted for test in the 305-day division, although these still form only a small percentage of the total cows tested for certificate of record. Sixty first-class 305-day certificates were gained during the year, 54 of these going to Jersey cows, 3 to Friesians, 2 to Milking Shorthorns, and 1 to an Ayrshire. In addition, 12 Jerseys and 2 Friesians qualified for second-class certificate in this branch of the C.O.R. test.

The 305-day division was introduced in 1930, and since that date 494 cows have qualified for certificate in this division, 447 being Jerseys, 39 Friesians, 3 Milking Shorthorns, 4 Ayrshires, and 1 Red Poll.

Jerseys.

Class Leaders.

Some excellent records were made by Jersey cows, and no less than three previous class-leaderships exceeded. Punga Nui Joyce has already been mentioned. This outstanding cow now holds both the junior and senior two-year-old records. In the three-year-old class Mr. A. Montgomerie's Glendale Silver, 631·42 lb. fat, gives way to Pukeroa Wheaten Wafer, with 700·76 lb. fat, this cow being owned by Mr. F. Geck, of Te Kauwhata. In the mature class Mr. Truby King's Meon Lucullia, with 741·26 lb. fat, takes the place of Mr. H. Salway's Hua Brook Perfect Lady, who gained the leadership on a record of 676·13 lb. fat.

The class leaders are now as follows :—

Table 14.

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat required for Certificate.	Yield for Season.		
				Days.	Milk.	Butterfat.
Junior Two-year-old.		Yrs. dys	lb.		lb.	lb.
Punga Nui Joyce ..	D. Yandle, Te Wera	1 349	250·5	305	10,122·0	590·91
Senior Two-year-old.						
Punga Nui Joyce ..	D. Yandle, Te Wera	2 337	284·2	305	11,838·7	690·13
Three-year-old.						
Pukeroa Wheaten Wafer	F. Geck, Te Kauwhata	3 165	303·5	305	12,853·9	700·76
Four-year-old.						
Hatcliffe Lady Gay ..	H. J. Kaye, Huinga	4 60	329·5	305	10,619·9	664·49
Mature.						
Meon Lucullia ..	T. King, New Plymouth	5 55	360·0	305	12,382·3	741·26

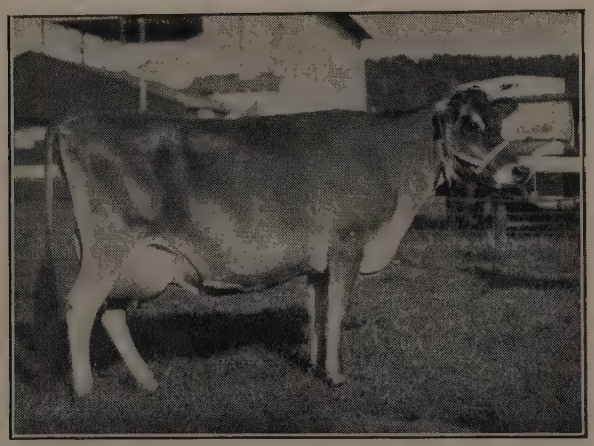
Jersey Class Averages.

The production averages, according to age class, of the 54 first-class certificates issued to cows of the Jersey breed in 1937 are given in Table 15. The average for all the cows was 455·63 lb. fat, and the average test 5·63 per cent.

Table 15.

Class.	Number of Cows.	Average Yield for Season.		
		Days in Milk.	Milk.	Butterfat.
			lb.	lb.
Junior two-year-old	184	298	6,604·4	376·30
Senior two-year-old	48	302	7,783·7	437·85
Three-year-old	79	299	8,147·4	452·59
Four-year-old	49	299	8,544·9	482·89
Mature	98	300	9,035·7	491·28
All	458	299	7,722·0	431·92

Average test, 5·59.



Meon Lucullia. (Owner: Truby King, New Plymouth.)

Age, 5 years 55 days; days in milk, 305; milk, 12,382·3 lb; fat, 741·26 lb.

New class leader, Mature Class, 305-day test.

"Exporter" photo.

Friesians.

Class Leaders.

There was one change in the Friesian class leaders, this occurring in the senior three-year-old class, in which Paepaetahi Jewel, with 529·94 lb. fat, displaces Mr. H. G. A. Cameron's Sealands Alcartra Fobes, whose certificate was gained on a production of 389·04 lb. fat. The new class leader is owned by Mr. A. F. Perkins, of Taradale, Hawke's Bay.

The list of Friesian Class leaders is as follows :—

Table 16.

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat required for Certificate.	Yield for Season.		
				Days.	Milk.	Butterfat.
Junior Two-year-old.		Yrs. dys	lb.		lb.	lb.
Sealands Magpie Pietertje 2nd	H. G. A. Cameron, Weraroa	2 22	252·7	305	11,727·4	454·16
Senior Two-year-old.						
Rosevale Beauty Posch Griselda	E. H. Watson, Windsor	2 216	272·1	305	12,273·5	468·50
Junior Three-year-old.						
Totara De Kol Nina	Piri Land Co., Auckland	3 117	298·7	305	16,005·9	501·37
Senior Three-year-old.						
Paepaetahi Jewel ..	A. F. Perkins, Taradale	3 354	322·4	305	12,342·7	529·94
Junior Four-year-old.	..	..	..	..	..	..
Senior Four-year-old.						
Ellerlea Aaggie Segis Minto	C. H. Steadman, Pokapu	4 357	359·2	305	15,311·9	557·71
Mature.						
Ellerlea Egie Segis Minto	C. H. Steadman, Pokapu	6 345	360·0	305	16,303·1	650·85

Friesian Class Averages.

The three Friesians which gained certificates during the year were credited with an average production of 422·86 lb. fat from 10,035·5 lb. milk in 305 days.

Milking Shorthorns.

The two Milking Shorthorns certificated during the year put up very creditable performances. Both cows were tested by Mr. H. C. Schroder, of Richmond, Nelson. One, Waimea Fay, yielded 539·90 lb. fat from 14,365·5 lb. milk in the 305 days, while the other, Hillview Kitty 2nd, qualified on a production of 468·01 lb. fat from 12,696·5 lb. milk. Both were in the mature class.

THANKS.

It is desired to once more express appreciation to the secretaries of the various Breeders' Associations connected with the C.O.R. testing for their courtesy and co-operation.

Kiteroa Gamboge Dariol. (Owner: S. Irwin Crookes, Auckland). The highest C.O.R. Jersey in the three-year-old class, 1937.

Age, 3 years 77 days; standard, 319·7; days in milk, 365; milk, 14,128·8 lb.; fat, 836·14 lb.

"N.Z. Farmer Weekly" photo.

Lime and Lucerne.

THE inoculation of lucerne-seed with suitable cultures has, in itself, proved of such extreme benefit in the establishment of certain lucerne stands that the importance of liming may at times be discounted. However, while inoculation alone may bring about the desired results, such is not always the case, as the following experiences on two farms of somewhat similar soil type in the Christchurch district will show.

On farm No. 1 culture-treated seed was sown on land limed at the rate of 15 cwt. per acre. In sowing out the area the lime-distributor was inadvertently allowed to run empty half the length of the field. On this unlimed strip the lucerne failed to flourish, while on the remainder of the field it established rapidly.

On farm No. 2 inoculated seed sown on unlimed land established rapidly although without inoculation it failed to flourish. On farm No. 1 lime was a limiting factor, while on farm No. 2 treating the seed with suitable cultures was all that was necessary to bring about satisfactory results.

—*J. G. McKay, Christchurch.*

Truck Farming at Pukekohe.

J. E. Bell, Instructor in Agriculture, Fields Division.

(Continued from March Issue.)

THE onion-plant is very delicate and will not stand wet conditions or drought. It takes at least seven months to mature, and is growing during the wettest and driest periods of the year. The growing of the crop entails much work and expenditure, so it is grown commercially only on soils which will grow good crops year in and year out. Soils on which onions are liable to fail in some seasons are not used for the growing of onions for the market. The onion not only requires a soil which is well drained in winter and moist in the early summer, but it needs a fertile soil.

These soil requirements are met in the volcanic soils on and around Pukekohe Hill, the chief onion-growing centre of the North Island. Here about 350 acres of the straw Spanish variety are grown annually. Brown Spanish onions, being very susceptible to mildew (*Peronospora schleideni*), do not develop properly at Pukekohe through attack by this disease. The soil on Pukekohe Hill does not vary greatly in fertility and texture. The onion produces good crops year in and year out anywhere on the "Hill." However, there are certain areas which are noted for their productiveness as far as onions are concerned. The heaviest crops of onions are grown on the hill, particularly on the northern slopes which have the sunniest aspect. There yields of 16 tons per acre of onions are common.

A crop of onions in full growth. Very soon the leaf growth will cease and the bulbs, which cannot be seen in the photo because of the obscuring leaf-growth, will commence to swell. To the left and right of the onions are pumpkins.

Two Types of Crops.

Two types of crops are grown—(*a*) transplants, (*b*) seedling.

(*a*) *Transplants**.—The seed is sown by means of a Planet Junior machine about ¾ in. deep in rows 1 ft. apart at the rate of 1 oz. per chain in late March and April on a fine and firm seed-bed. Each 5 lb. sown in this manner will provide sufficient plants to plant out 1 acre. In July, and even as late as September, the onion-plants are wheel-hoed out of the beds. The plants are topped and tailed for ease of handling† and transplanted in rows 1 ft. apart and 4 in. apart in the rows. The transplanter holds a bundle of onion-plants in one hand and with the other presses the roots of each plant into the soil with the thumb, allowing the plant to lie over on one side. The plants soon strike, and in a few days are growing upright. The rows are marked by means of a wooden implement shaped like a large rake. It is hand-drawn, and each of the five wooden teeth marks a row.

The land is worked some time before transplanting so that it is fine and firm, for onions do poorly on recently-ploughed and hurriedly-prepared soil. Applications of up to 1 ton of lime per acre may be given before transplanting, and the fertilizer is broadcasted at the same time as the rows are marked. Fertilizer mixtures employed are similar to those applied to the potato crop, except that less of the quick-acting fertilizers is used. For the production of quick-maturing, early onions quick-acting fertilizers are applied in greater amounts, but for long-keeping qualities the mixture may comprise only slow-acting phosphatic fertilizer such as bone-dust and generally lesser amounts of super and nitrogenous fertilizers. The type of fertilizer applied also varies according to the fertility of the soil, more and quicker-acting fertilizer being applied to fields in poor heart. The amounts applied vary from 10 cwt. to 1 ton per acre. The plants soon strike fresh roots, which push their way rapidly into the soil in all directions and all the old roots die.

Destruction of Weeds.

The weeds are destroyed by hand-weeding near the rows and by means of wheel hoes. The hand-weeding is carried out by means of a piece of hoop iron about 8 in. long bent at right angles about 2 in. from one end. The 2 in. end is sharpened on one side and the implement is held by the longer end, which is bound for better grip. This implement can be used to cut out the weeds very close to the plant safely and quickly by always keeping the blunt back of the implement facing the onions. The wheel-hoeing is carried out at a constant shallow depth of about 1 in. and sufficiently deep to cut out the weeds. As the onion-roots soon traverse the space between the rows it is a mistake to intercultivate them deeply, and when the plants are well bulbed intercultivation ceases.

The transplanted onions grow rapidly to a large size, and the more mature onions appear on the market about mid-December, if there is a shortage, and often prices then are very high—up to £20 per ton. These early onions are harvested while the leaves are still green, and yields are usually about 6 tons per acre. The green tops and roots are cut off with shears and the onions are marketed without delay. Needless to

* This method of growing onions has been reported recently in the *Journal of the Ministry of Agriculture for England* as a new method and one which was commented upon favourably in the article. It is an old practice at Pukekohe.

† There is reason to believe that this shortening of the leaves and roots of the plants reduces the yield somewhat.

say, they go into consumption very rapidly, as the demand is great. Most of the transplanted onions are harvested in January, by which time prices are stable at a low figure, usually about £5 per ton. The harvesting from now onwards is carried out in a thorough manner. The harvesting commences when most of the onion-leaves have wilted or are dead. If many of the onion-tops persist in growing, as often occurs in wet summers, they are bent or broken by running an empty, round, light-iron water-tank over the crop. At harvesting-time the rows of onions are wheel-hoed out of the ground, shaken free of soil, and left to dry. When dry they are raked into rows and clipped with hand-shears. The roots are cut close to the onion, and usually the tops are clipped off to within about ½ in. of the onion. The onions are left to dry out still further. The clipping of the tops is supposed to aid the drying-out of the neck of the onion. If rain intervenes the windrows are turned until dry. In wet seasons the turning of the onions is a long-drawn-out process, and the onions may be in the open fields for over a month.

A number of onions become bolters—that is, they grow seed-stalks. Bolters are more prevalent in early-sown and early-transplanted onions, and for this reason it is not safe to sow seed before March. Onions with seed-stalks are quite edible, but they are not marketed unless supplies are scarce.

Seedling Crop.

(*b*) *Seedling*.—The seedling crop is sown in late July and early August. If sown earlier than this, bolters are liable to be prevalent, if later, the crop will be a light one in dry seasons. The seed-bed should be fine and prepared some time beforehand so that it has settled firmly. Lack in this precaution in dry seasons results in patchy strikes. The ground for the seedling crops should be very free of weed-seed because the onion crop is slow in growth and with its meagre leafage affords weeds very little competition. The seedling crop is sown with a Planet Junior machine at the rate of about 5 lb. per acre in rows 1 ft. apart. No thinning is advisable, and it has been found that gaps cannot be filled satisfactorily by transplanting from spring-sown seedlings. The fertilizer is sown broadcast at seeding-time at about 18 cwt. per acre, and a little fertilizer may be sown with the seed. Lime is applied some time before sowing. The seedling crop is later than the transplant in maturity and is harvested in February and March. Harvesting conditions being equal, it produces slightly better keeping onions. The yield per acre is slightly less. The seedling crop has become increasingly popular and now occupies about one-third of the area sown, whereas about five years ago autumn sowing and transplanting was generally practised.

Several years ago the straw Spanish was practically the only variety sown. The straw onion is flat-topped and somewhat the colour of a grain-straw. It resists mildew, and the selection grown at Pukekohe is a high yielder. It is thin-skinned and of a very mild flavour and requires a short time in cooking. The brown Spanish onion is found to fail in the following characteristics: It takes mildew badly during growth, and frequently so badly that it fails to produce a bulb. If it does grow a fully mature

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bulb, the yield is lower than that of the light straw Spanish onion. It is later in maturity. If it does mature it is better-keeping, but immature bulbs checked through mildew keep badly. It has a thick skin and there is a greater loss from peeling. It is strong in flavour and rather woody, and therefore is of poor eating-quality. In shape the brown Spanish is more spherical than the straw Spanish. It is dark-brown in colour.

Keeping Qualities.

The straw Spanish, therefore, deservedly has been grown to the exclusion of brown Spanish, but the trouble with the former was that it does not keep well. Straw Spanish onions do not last after April as a rule. An onion-seed grower, Mr. John Turbott, of Buckland, brought about an improvement in the Pukekohe straw Spanish onion by selection. He produced an onion slightly darker in colour of the skin than straw Spanish and slightly more spherical in shape. It is sometimes called the dark-straw Spanish onion. This onion resists mildew as well as the straw, and there is a little reduction in the yielding-power. It is a little later in maturity, but its eating-quality is good, and it is a much better keeper, thereby earning the name "Longkeeper."

The longkeeper onion has rapidly increased in popularity and now occupies one and a half times the area of straw Spanish. The effect of the introduction and more general growing of the longkeeper onion has been that reliance can be placed in a supply of onions for a much longer period from Pukekohe—up to September, even after wet harvests. After April the price received for onions rises as stocks are cleared, and by September prices are usually about £9 per ton. After September New Zealand has to depend on imported onions from California, Canada, and sometimes Japan. Almost half of the longkeeper onions are spring sown whereas the large proportion of the straw Spanish are autumn sown for the production for the main part of early onions. Both the Pukekohe straw Spanish and longkeeper strains are at Pukekohe 50 per cent. better in yield than the mixed poor-yielding strains from Australia and the South Island. The longkeeper is becoming popular in the South Island, and its introduction there will increase yields and lengthen the short time during which supplies can be depended on from Marshland where most of the onions are grown. At the present time, even if wet harvests are experienced at Pukekohe and dry ones at Marshland, the Pukekohe onions will keep the longer. The Pukekohe crops, however, are not so heavy as the soil is much less fertile. An average fully matured crop of onions at Pukekohe yields about 12 tons per acre.

A cover-crop of barley. Green manuring is necessary on intensively cropped land.

The harvested and sun-dried onions are sold off the field or stored. For storing for sale in the winter the drying must be thorough. The necks are weak spots in the onion and the place where moisture remains the longest. The onions are usually stored loose in sheds, and to a less extent in sacks or crates. They are stored until they show signs of sprouting or the development of fresh roots. These signs of growth appear first at the tops of the heap in the sheds, where the atmosphere is more moist and warmer.

Seed Selection.

Bulbs for seed are selected by the seed-grower after harvesting. Some are selected from a small area of onions grown especially for the purpose. The bulbs are planted about 18 in. apart about 3 in. deep in rows about 2 ft. 6 in. apart—the straw variety in May and the longkeeper in July. The seed-raising areas are generally located on volcanic soil areas near the sea-coast mostly near Auckland. Near the sea-coast there is little likelihood of mildew developing and retarding and destroying the growth of the leaves and seed-stems. A bulb produces four or five seed-stems, each bearing one seed-head. The seed plots must be intercultivated and hand-hoed to keep weeds in check. Sometimes they are sprayed with bordeaux or burgundy mixture in an endeavour to subdue the mildew. As each seed-head ripens it is cut short and spread on canvas sheets in the sun to dry. In rainy weather and at night the canvas is folded up and the seed carried under cover. The drying of the heads and threshing of the seed may be a very protracted business in showery summers and autumns, entailing much tedious work in spreading out and taking in the canvas sheets. When the seed is threshed out and dried hard it is collected and thrown into a bucket of water. The light seed (which is of poor vitality and low germination) and the dust float on the top of the water, while the best seed sinks to the bottom of the bucket and is separated. The light seed will produce only poor yields and is discarded. The good seed is dried and is ready for sale. Yields of seed vary greatly from season to season. Some crops have been known to give over 1,000 lb. of seed per acre and others only 50 lb. per acre. If the harvesting period is wet and windy yields are low. It is only in dry summers that heavy yields obtain. Other parts of New Zealand, such as Marlborough, are better suited for seed-production than Auckland, and probably seed of the Pukekohe raised strains of straw Spanish and longkeeper onion will soon be produced in those localities for use all over New Zealand.

Rust-Free Oat.

On an oat variety trial laid down with oats supplied by the Pure Seed Station at the Winton Experimental Farm it was noticed that at the time of inspection in the middle of March nearly all the varieties were badly infected with rust. Fully 70 per cent. of the varieties sown were showing a distinct redness due to the rust.

However, one variety, Anthony, was practically immune, and it was found that this, compared with the other varieties, was distinctly free from the disease.

Compared with each of the other thirty rows, this variety showed slightly shorter and finer growth. So free from rust was this variety that the Instructor had difficulty in finding a sample of stalk on which the disease showed at all.

—W. L. Harbord, Invercargill.

Factors in Successful Farming.

(4) Points to be Considered in Purchasing Live-stock and Plant.

W. N. Paton, Senior Investigational Officer, Accounts Division.

THE treatment of the subject-matter is this article from a semi-philosophical viewpoint presents some difficulties, and may be considered by practical farmers as unwarranted. Nevertheless, it will be readily accepted by most people that the equipping of a farm is just as important as the purchase of the land itself, and there are many points connected with the purchase of equipment, and with machinery in particular, which might well be closely studied by present and potential farmers. Although certain features discussed in this article may sound elementary, let it be remembered that uneconomic purchase of machinery or plant represents large sums of money on the farms of New Zealand.

In purchasing a farm as a "going concern" stock and chattels can sometimes be acquired cheaper than otherwise would be the case, but one needs to be assured that such a proposition is really as cheap as it may at first appear. Therefore, it is necessary to analyse the position after assessing the respective values of farm, live-stock, and chattels. The suitability of each, and of the composite whole, to the aims of the prospective purchaser must not be overlooked. In selling one farm and purchasing another, stock and chattels may be transferred from one place to the other, provided the farms concerned are not too distantly separated. This practice is not always advisable because of differences of district and farm individuality. In separately purchasing live-stock, plant, and equipment, &c., the latter points are also a first consideration.

The need to procure a proper balance between land, stock, and plant is undoubtedly the most outstanding keynote of this month's subject. To those with greater knowledge and experience, no serious difficulties regarding plant, equipment, and implement requirements, &c., are likely to be encountered other than monetary restrictions, but as regards live-stock the matter cannot be treated at all lightly by either the experienced or inexperienced.

As previously explained, it is not possible in a series of short articles to cover more than the broader aspects of the subject. The purpose in view is to direct attention to factors of economic importance, and endeavour to engender a better appreciation of method in all farming affairs. Those requiring more detailed information in this or other instances can obtain useful advice from various officers of the Department and from representatives of stock and station agents and of other reputable firms.

Plant and Equipment.

Live-stock farming in New Zealand is well mechanized; particularly so in the case of dairying, which lends itself to exploitation in this direction. This fact

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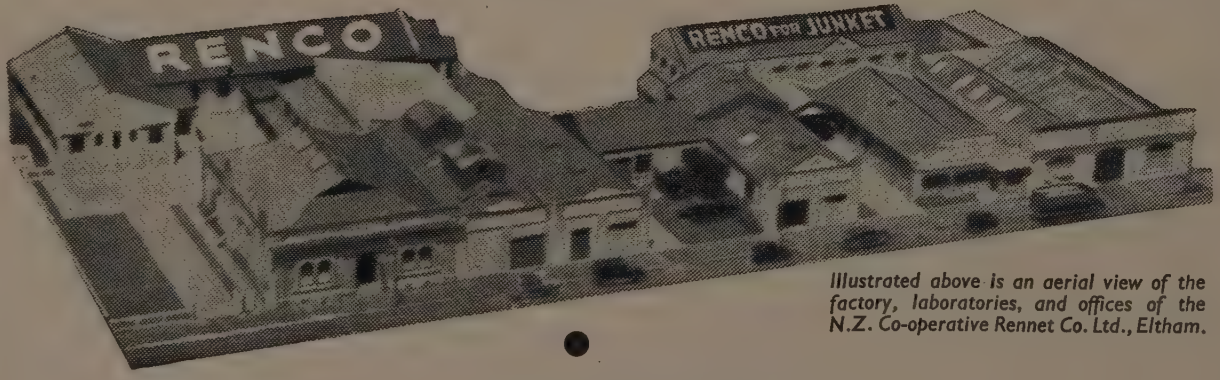

Illustrated above is an aerial view of the factory, laboratories, and offices of the N.Z. Co-operative Rennet Co. Ltd., Eltham.

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is all the more notable, since all-the-year-round pasturing of live-stock is generally practised. As labour costs (owner or hired) comprise, even under the present state of mechanization, from about one-third to about one-half of total production costs in New Zealand dairying and sheep-farming, and because wage-rates are higher here than in most competing countries, efficient and balanced mechanization is of extreme importance.

Broadly speaking, there are two main divisions of farm labour. One concerns work bearing directly on productivity of soil, pasture, crops, and live-stock, and the other concerns work connected with the "harvesting" of live-stock production and general routine work not materially reflecting on productivity in general. Naturally, the aim should be to reduce labour time in the latter section as much as practicable, having regard to the very necessary essential of maintaining high quality in the product produced.

In this connection no better case could be cited than dairying. The progress that has been made in the saving of labour time and expense in the dairy industry by the adoption of home separation, cream collection, releaser milking-machines, walk-through bails, power separation, power pumping and reticulation of stock-drinking water and skim-milk, &c., over a period of little more than twenty-five years, together with the raising of quality of produce, is an epic of endeavour and achievement. With respect to farm-work having a bearing on productivity in general, the first requirement is to have the man-time available.

With the proper choice and efficient utilization of plant and equipment, &c., considerable savings in the two main divisions of labour can be effected. That portion of farm-work which does not materially affect general productivity is usually of a daily or regular routine character, and hence constitutes a first call on labour. An example of this class of work is milking and general shed-work, calf and pig feeding, &c., performed night and morning in season on dairy-farms. If the shed equipment is insufficient or badly organized, too much time will be spent in such operations, and it will require (*a*) employment of additional labour for field-work, or (*b*) longer daily hours being worked by the owner than need be the case. It should be recognized that the latter limits the degree of success attained as well as the former, for the reason that the farmer is restricted in his opportunities to attend to planning, organization, diary work, &c., that may be necessary.

Choice of Motive Power.

In the choice of motive power there are quite a number of points to be considered. Locality often narrows the choice. One of the main points to bear in mind is initial capital expense not only of the unit itself but also of costs of transport and installation. It is a common error to install a unit of too great or too low a power output, and an error in either direction bears directly on efficiency in the cost of running, repairs, and maintenance, and rate of depreciation. Transmission of motive power is affected by the alignment of shafting, state of bearings, and belt tension. Efficient transmission permits the use of smaller motive units and lower running-costs. When considering the purchase of a unit, fuel-costs and the cost of transporting any particular type of fuel should be investigated. In the case of electric or water motive units, costs of reticulation are of extreme importance. Where in doubt concerning choice of motive power, delay for proper consultation is advisable, as it represents one of the major decisions on any farm.

Somewhat similar remarks are applicable in the choice of equipment and plant requiring to be power driven. Capital cost, cost of upkeep, length of useful life, dependability, and efficiency are the main points to look to. Be sure the capacity of the plant is within the limits necessary, provision for future requirements have to be considered, and initial purchases should be made with development in view.

As regards implements, circumstances affect the position a great deal. It is only in large-scale enterprises that an expensive and comprehensive range of the more specialized type of implement is warranted. In the case of the average sized farm, general utility implements meet the main requirements quite satisfactorily. With the smaller farms share ownership of the more expensive implements, hiring of them, or having the work done by contract generally prove to be the more economical arrangements. Some small farmers find it feasible to cater for contract work, and by this means lighten their own implement overhead. Much depends on the class of farming, on the type of country, on the physical state of the soil, on district peculiarities, on how much cultivation work is regularly involved, and to what extent it is dependent on the calendar or weather.

Care of Implements.

The avoidance of delays may be of considerable importance in certain classes of farming or in certain districts. It can be accepted that all implements are to be purchased, as the day has passed when farmers generally employed home-made clod-crushers, brush harrows, and sweeps to any extent. It is recognized that implements need to be properly cared for and housed from the weather, but this

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fundamental is often neglected, with a corresponding increase in potential cost to the farmers concerned.

Regarding tractors, horses, farm motor-trucks, and horse-vehicles, the position may be classed as somewhat controversial certain aspects. As in the case of implements, much depends on the circumstances in each case. In the main, tractors and trucks are more applicable to larger-scale farming on country of comparatively easy conformation. A good deal depends on the speed with which cultivation work may have to be done at various times of the year, either in keeping up with the programme or in meeting weather requirements. This relationship to availability of labour is of the greatest importance. Good-class farm horses are fairly high in price, whereas smaller and more adaptable tractors are now available not only at a lower price, but also cheaper in running-expense than hitherto. Motor-trucks are proving their worth to the larger cheese-factory suppliers, especially where the distance to the factory is on the high side. Second-hand cars converted into trucks are popular with many farmers, being used for both farm and private purposes.

In the purchasing of plant, equipment, and implements it is helpful to prepare lists of what is required and to go over these carefully item by item as regards cost to discover how best provision can be effected for present and future requirements within the total funds available for the purpose. Do not omit harness, tools, and sundries. Be sure that the provision contemplated suits the circumstances of the case, and that it is neither too meagre nor too lavish, as in either of the latter cases what may be otherwise a well-balanced and sound proposition as a whole may be rendered uneconomic.

Live-stock.

On the whole, it can be said that certain breeds suit certain conditions better than others. "The lighter the pasture the lighter the animal" is quite a sound general rule. With sheep-farming there is a wide range of types of farming practised, right from what is almost tantamount to straight-out wool-farming at one end to intensive fat-lamb raising at the other. Naturally, within this wide range many more or less distinct management types can be instanced, governed in the main by conformation and fertility of the country involved. The greater part of New Zealand sheep-farming necessitates the employment of a dual-purpose animal. This practice entails somewhat more difficulties as concerns type and breed than is the case with the single-purpose animal.

In the case of dairy-farming, the range in conditions and management is much less than that found in sheep-farming. Hence, the issue is considerably simpler as regards type of live-stock, the special purpose dairy animal filling the bill admirably. As a broad statement, the heavier dairy breeds are the heavier individual producers, especially when fed to full capacity. On the other hand, they are heavier feeders than the lighter dairy breeds, thus affecting carrying-capacity. In the main, the heavier breeds are at their best on heavy pastured, easy country. The lighter dairy breeds appear to suit average New Zealand conditions and management quite well, and have proved extremely popular.

The four main aspects of farm live-stock are breed, class of stock, type strains within a breed, and individuality. In purchasing live-stock the farmer has to have regard to all four of them. His principal aim at all times should be to have as much uniformity as possible within the flock or herd, since breeding and management problems are considerably simplified thereby.

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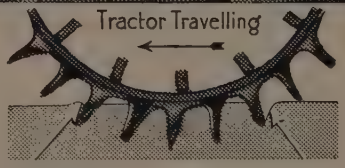

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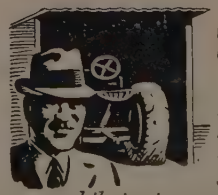

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Selection of Stock.

What class of stock a prospective farmer may desire to start with is a question he has to decide for himself and perhaps in accordance with his pocket, but he has to be extremely careful that he does not practise false economy. It would be uneconomic to place a herd of poor-quality milking-cows on high productive pastures, just as it would be equally uneconomic to stock poor-type pastures with high productive capacity stock. Therefore, it behoves the farmer selecting a stock to see that they are of a class and quality in accord with that of the farm and his management ability; remembering, of course, that too low a standard in all respects may be a very doubtful proposition, unless it possesses marked redeeming features.

Live-stock farming is difficult to conduct successfully where entire dependence on purchased replacements of productive stock is practised. For this reason the importance of breeding replacement stock cannot be stressed too strongly, especially in aiming for a reasonably high degree of uniformity of a given type. It is seldom an easy matter to secure stock of the desired uniformity, and it should be recognized also that where regular purchases are being made year by year this often proves the medium of introduction of disease. Hence it is generally borne home to farmers in the long-run that it pays to do one's own breeding.

Recognizing this aspect, it follows that the original purchase of foundation stock is an extremely important matter. Generally speaking, grade stock should breed more consistently to type and quality than do crossbred stock, while pure-breds should show an improvement in this respect over grades. Line or in-bred stock should prove more consistent in productive performance of progeny with stock not so bred, because of the intensification of desirable qualities in the blood lines.

Question of Breeds.

As regards breed, the farmer has to make his own decision, whether this pertains to crossbred, grade, or purebred stock. Certain breeds are, of course, dual purpose, whereas others are special-purpose in general type. Due to variability of the individual animal, many types may be represented within a breed, all having their advantages or disadvantages when viewed from different aspects. Before it is possible to secure any appreciable degree of uniformity within the flock or herd it is necessary to select and breed to a given type.

In the course of time, work of this nature leads to the establishment of type strains. Naturally, hand in hand with the establishment of a uniform strain, work on the progressive raising of the productive worth of the stock has to be included. When attained, such a stage represents more or less the acme of herd or flock improvement that can be attained by the ordinary farmer not specializing in stud-breeding work.

In aiming for such a goal, the better the foundation at the start the better the progress that is likely to be made. The ideal is to set a course at the outset from which no material divergence or wholesale recasting of plans will be involved.

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Members within a breed are highly variable for such factors as size, productive capacity, early or late maturity, longevity, constitution, and vigour. Among productive aspects we have such factors as high and low testing, and high and low milk-production dairy stock; multiple births, staple and fineness of wool, and good and poor meat types in sheep; and long and lean as compared with short, thick, and fat carcass types in pigs. In accordance with what are the aims of the prospective farmer, or those which he may have been recommended to follow, so will he have to lay his plans.

In the initial selection of foundation stock the adoption of helpful methods to the end in view are vitally necessary. Selection work is generally based on three main aids—breeding records, production records, and personal appraisal. Of these three aids, the two first mentioned are the most important, but if these are lacking, considerable dependence has to be placed on appraisal. It is essential that prospective purchasers be sufficiently familiar with the employment of such aids, or be able to secure help in this respect from some competent quarter.

As regards flock or herd sires, it is false economy to endeavour to obtain these cheaply, as good animals always command good prices. Moreover, the sire is half the flock or herd. In order to make rapid progress in flock or herd building, the sire should be of considerably higher quality than the females, especially where the latter represent fairly good-class stock. As well as being of higher quality, the sire should be propotent—that is, his influence in the progeny should show up to greater extent than that of the females. Outstandingly prepotent sires are generally few and far between. Strongly developed masculinity, vigour, and constitution are the most reliable indications of prepotency, especially when found in line or inbred animals of sound ancestry.

Appraisal of Stock.

It is probably in the appraisal of stock for such indications of productive capacity or worth, constitution, temperament, and character that the most divergence in accepted views are held, and it is there that the inexperienced may find themselves confronted with considerable difficulty. Help in the evaluation of pedigrees and production records can be had from all sides, and a discussion thereon is not warranted on this occasion. The appraisal of stock is mainly concerned with the adoption of certain loose standards or terms dealing with conformation, or the judgment of various parts of the animal and their bearing on general shape and physiology. Varied methods of gauging conformation are used, but the position is not very clear-cut and straightforward. There is considerable opportunity for the application of more systematic methods of appraisal than is generally recognized. For instance, the length of the head from the poll to the flat of the muzzle and the length from hock to heel are units in conformation which have been found to be the least variable, and hence the proportionality of the animal can be gauged from them in relation to the standards of excellence sought after.

Appraisal should always be made, using methods which will readily disclose how closely or otherwise the animal in question conforms to a given standard. Therefore, the standard employed should be such that it can be measured by a unit which is a fundamental part of the animal, such as the length of the head. Although proportionality of parts is variable, the parts vary with the size of the animal. As previously mentioned those parts which vary most consistently with size of animal are the units of head-length and hock to heel-length, particularly the latter.

Relationship of Conformation.

Such conformation measures need, of course, to have as close a bearing and correlation with productive capacity and general worth as possible. Much useful work in this direction has been done, and considerable information is available to those who desire it. Various adaptations of such aids have to be employed in meeting the case of the various kinds of live-stock, breeds of same, and age-groups. It is desirable to get away as much as possible from methods which employ such terms as "long between the hip and pin bones," which is only interpretable with any surety by those of considerable experience. Again, measurement of conformation in actual inches, &c., is a very complicated business, as it entails reduction and adaptation by suitable formulæ to given standards of excellence.

However, by employing really helpful measures of excellence in conformation as indicative of quality, and other judging methods for vigour, constitution, health, &c., it should be possible for even the lesser experienced to select from live-stock with reasonable success. Even where breeding and production records are available, appraisal methods are a most useful supplement. As regards health and freedom from disease, it is most desirable that the initial herd or flock should be as sound and clean as possible. In this connection the veterinary officers of the Department provide a useful service which should be availed of.

Finally, with regard to the selection and purchase of live-stock, there are many important aspects to be given attention which, in the aggregate, present quite a formidable task to those desirous of making the best possible start within the limits of the facilities at their disposal. Live-stock matters usually do not receive as much consideration as that devoted to the farm, whether in purchasing or in management. To get the best from good pastures good stock are necessary; more than this, both good stock and good pastures require the best possible management. The aim in success should be to provide a proper balance in all three respects.

Concluding Remarks.

To do good work good tools are necessary, and in this respect the farmer should recognize that live-stock are just as much tools of trade as are plant equipment. Real craftsmen often prefer to work with a limited number of tools, but how carefully they choose that equipment! Also, in farming it is not a matter of having a lot of tools, but of having a sufficient number of good ones and of being proficient in their use.

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Pasture Mixtures.

A. F. Greenall, Instructor in Agriculture, Balclutha.

THE value of a pasture which establishes rapidly, which yields a large quantity of good-quality grass during all the seasons of the year and has the shortest possible winter dormant period, and which can stand high stock concentration, fairly close and continuous grazing, and which responds well to top-dressing, and yet is of a perennial nature is self-evident. For every variation of climatic and soil conditions, and for all types of grazing animal, there is probably a combination of certain species of grasses and clovers that most closely conform to the requirements of a good pasture.

The question asked is, "What facts does a farmer take into consideration when designing a seed-mixture for his farm?" The information at his disposal are facts based on previous observations of the performance of species of grasses or clovers on his own farm, or his neighbour's farm, and these facts accumulate slowly, often as the result of the slow and expensive process of trial and error. Undoubtedly such methods would ultimately lead to satisfactory results, but the attainment of satisfaction can often be accelerated by attention to certain fundamental rules governing the choice of grass and clover species to be used in a pasture mixture.

Fertility and Stock Management.

For instance, where the fertility of a farm is being maintained by a nice adjustment of stock-grazing and saleable crops it is superfluous to include in the seed-mixture pasture plants of higher or lower fertility requirements than that obtaining on the farm. Plants requiring high fertility will in the short or long run die out, while plants requiring low fertility will not give the bulk or quality of feed. Where a scheme of fertility improvement is being adopted by means of liming, top-dressing, and enlightened stock management it is, however, often wise to include perennial plants of a slightly higher fertility standard than at present obtains on the farm. Similarly, in the case of bush burns where the high fertility resultant on the accumulation of ash after the burn later falls as this store of plant-food is used up, or where a short-sighted policy of over-cropping is in vogue, the inclusion of plants of low fertility in the pasture-mixture is essential to give a cover as the high-fertility species die out, consequent on a decrease in fertility.

Grasses and Clovers in Decreasing Order of Fertility.—Rye-grass, foxtail, timothy, cocksfoot, *Poa pratensis*, dogstail, brown-top, Chewings fescue, danthonia, red clover, white clover, alsike, subterranean clover, *Lotus major*, suckling-clover, haresfoot trefoil.

Most grasses and clovers have a definite range of moisture requirements, outside of which growth is retarded if not actually prevented. Consequently, it is of little use including a drought-resistant plant in a grass-mixture for swampy land, for even if it did grow production of leafage would be at a minimum. However, where a dry season is normally experienced in an otherwise wet year the inclusion of some drought-resistant plants is often advisable to provide some feed during this dry period.

Grasses and Clovers in Order of Decreasing Moisture Requirement.—*Poa acquatica*, floating sweet-grass, meadow-foxtail, timothy, rough-stalked meadow-grass, *Poa pratensis*, rye-grass, brown-top, cocksfoot, crested dogstail, danthonia, *Lotus major*, alsike, red clover, white clover, suckling-clover, subterranean clover, haresfoot trefoil.

Recovery after Grazing.

The rapidity of recovery after protracted and close grazing is an important point influencing the choice of grass and clover species to include in a mixture. Some plants such as cocksfoot are shade-loving plants, and, if close-grazed, leafage and tillers are removed, allowing the crown to dry out. This feature is probably associated with the degree to which the crown of the grass is buried. Plants such as cocksfoot and broad red clover, with a raised open crown, do not appear to stand close grazing, as the young tillers are eaten out, leaving no nucleus for further growth. On the other hand, plants, such as rye-grass, white clover, and Montgomery red clover, which have buried crowns, stand closer grazing, as stock cannot do the same damage to tillers. Such extreme types of plants should be subjected to different methods of grazing, the high-crowned shade-loving types being grazed lightly with sheep or with cattle, the other types being suitable for closer grazing by sheep or horses.

Spring Growth.

It is apparent from observations of the growth of different grasses and clovers that the stage of initial growth in spring and the time that the plant ultimately reaches maturity differs from one species to another. Some grasses start growth early in spring and flower in early summer, while other clovers and grasses grow later in spring and do not flower till later. Some produce appreciable winter feed, while others produce autumn feed. It is apparent that, by utilizing a happy combination of different seasonal producing grasses and clovers, the distribution of growth over the whole year is more evenly balanced, and carrying-capacity so increased.

Grasses and Clovers in Order of Initial Growth from Spring.—Canary-grass, prairie-grass, meadow-foxtail, dogstail, rye-grass, timothy, cocksfoot, subterranean clover, suckling-clover, white clover, broad red clover, Montgomery red clover.

Generally speaking, perennial grasses and clovers should be included only in a permanent-pasture mixture. However, perennial plants are invariably slower to establish, and this dearth of feed early in a plant's life is overcome by the addition of quickly establishing annuals or biennials, which give a bulk of feed in the first year or two and then die out. This is a good practice when not carried too far, as in some cases an open, weedy sward has resulted from the sowing of even as little as 10 lb. of Italian rye-grass in a permanent pasture mixture.

Applying these generalizations to an examination of the average pasture mixture, which invariably includes a bushel of perennial rye-grass and 10 lb. of cocksfoot, it is evident that the inclusion of both of these grasses in sufficient quantity for almost a pure sowing of each violates the majority of the fundamental rules elucidated previously.

Place of Cocksfoot.

It would not be an exaggeration to state that 75 per cent. of pasture mixtures in general use contain 5 lb. to 15 lb. of cocksfoot, the general average being somewhere in the vicinity of 10 lb. per acre. This involves the expenditure of 15s. per acre, which is about half the cost of the total mixture. However, this expense would be justified if cocksfoot provided half the total production of the pasture. Observations over a wide range of conditions, even on the so-called belts of cocksfoot country, result in a conclusion that cocksfoot is filling a minor position

in the sphere of mixed pastures. However, the excellent swards of cocksfoot that one occasionally meets points to the fact that it is not the grass that is at fault, but the method of using the grass. Investigation into the reason for the success of a cocksfoot pasture usually shows that grazing has been light in the first year, hay has been made in the first year, or perhaps the cocksfoot has been drilled and very little perennial rye-grass sown.

The immediate cause for the failure of cocksfoot in many cases appears to be the inclusion of a large seeding of perennial rye-grass in the mixture. The quicker-establishing rye-grass appears first, becomes dense quickly and aggressive, leading to close and heavy grazing, which is inimical to the development and spread of cocksfoot. Even where only light grazing or haying occurs in the first year the rapidity of establishment and the aggressiveness of true perennial rye-grass appears to be sufficient to prevent the establishment of cocksfoot. One finds cocksfoot doing a trifle better in swards sown down with false perennial rye-grass which tends to die out early.

Verification of the contention that true perennial rye-grass when present in any quantity is detrimental to the establishment of cocksfoot was obtained recently in a trial in which two plots were sown down with similar mixtures of white clover, Montgomery red clover, and cocksfoot, one plot with 25 lb. of perennial rye-grass, the second with no perennial rye-grass but 19 lb. of Italian rye-grass. At a relatively early date a marked difference was noted in the rapidity of establishment by cocksfoot, which was present in greater vigour and density in the plot without perennial rye-grass. Both plots experienced similar grazing and otherwise similar treatment.

Where a mixed pasture with a fair amount of cocksfoot is required for use on fair to good country for either sheep or cattle grazing, for hay, but particularly for autumn grazing, a general recommendation appears to be the following mixture :—

	Per Acre.
Cocksfoot	.. 12 lb.
Certified Italian rye-grass	.. 7 lb.
Certified perennial rye-grass	.. 5 lb.
Certified white clover..	.. 3 lb.
Certified Montgomery red clover	2 lb.
	29 lb.

This mixture is not designed to replace the usual dominant rye-grass mixture, but to supplement this normal rye-grass mixture, which could be considerably cheapened by a reduction in the amount of cocksfoot included in it.

A farmer in the Rotorua district makes a practice of sowing from 5 acres to 6 acres of Japanese millet each year for supplementary dairy-cow feed in the summer months. He has again a good successful crop this season. The seed was sown in November at rate of 20 lb. per acre and was sown broadcast with 2 cwt. of super per acre. A few acres were sown at rate of from 30 lb. to 35 lb. per acre, and this has proved the most satisfactory, the millet not growing so coarse as with lighter seeding. During the dry spell in January the dairy herd of seventy-five cows was allowed one hour's grazing each day on the millet, and the results in improved butterfat returns have been very satisfactory, January month producing the highest returns for the season.

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Wheat-manuring in the South Island.

J. W. Woodcock, Crop Experimentalist.

EXPERIMENTAL work on the manuring of wheat has received a good deal of attention from the Fields Division during recent years. In this *Journal* for June, 1934, the results of one hundred and eighty experiments were summarized. Some of the conclusions based on these results were as follows :—

The use of 1 cwt. of superphosphate per acre at time of sowing was strongly recommended, but a greater quantity than 1 cwt. super per acre could not be advocated generally. It was indicated that phosphates such as basic super, ephos, and Nauru phosphate had proved inferior to superphosphate.

As there had been little or no response from muriate of potash in most of the trials, the use of potash as an adjunct to super was not advised. The addition of lime to super could not be advocated generally, although in some districts its use had some effect.

Although nitrogen had produced some spectacular results at times, the average increase from 1 cwt. of either sulphate of ammonia or nitrate of soda when top-dressed on wheat-crops in spring was 3¼ bushels per acre. In a few trials in which 1 cwt. per acre of sulphate of ammonia was mixed with super and sown with the seed a certain amount of germination injury sometimes occurred, and this detracted considerably from its use in this direction. It was therefore obvious that under the existing prices no general recommendations to use nitrogen either at seeding or as a top-dressing could be made. There did, however, appear to be some indication that better results would be secured from the use of nitrogenous fertilizer on wheat following a previous stubble crop than on wheat after crops such as grass, rape, or turnips. Experimental work in the 1935–36 and 1936–37 seasons was concentrated on stubble-sown wheat, in order to reach some finality on the above point. It is not intended here to give detailed results of such trials, but rather to summarize the main features as they affect the sowing of fertilizer with seed.

Sowing a wheat experiment.

It has been stated previously that the use of a greater quantity of super than 1 cwt. per acre could not be recommended generally, and this was based on the fact that, whereas the average increase of 1 cwt. super over no manure was 4 bushels of wheat, an. additional 1 cwt. super—*i.e.*, a total of 2 cwt.—further increased the yield by only ¼ bushel. Further evidence was obtained in the 1936–37 season which suggested that the optimum application of super was in the vicinity of 100 lb. per acre. In three experiments in which 75 lb. of super was compared with 150 lb., and in two experiments in which 100 lb. was compared with 150 lb., there were no significant increases from the use of the greater quantity.

Various reasons have been advanced for the relatively low responses of quantities of super in excess of 1 cwt., and it has been suggested that where the land has been previously limed more phosphate can be used to advantage. To test this out two experiments (at Fernside and Hunter) were laid down last season on land which had been limed in the previous two years (one area had received 2½ tons and the other 15 cwt. of carbonate of lime). In both trials super 1 cwt. was significantly better than no manure by 2 bushels. The increases from super 2 cwt. over super 1 cwt., however, were 0·9 bushels and 0·1 bushels respectively, neither increase being significant.

The weight of evidence available from experimental work on wheat conducted over a period of fourteen years points to the high benefits likely to be obtained from the use of 1 cwt. super with the seed, and is sufficient to discourage the use of a greater quantity than 1 cwt. of super in Canterbury and North Otago.

Use of Nitrogen with Seed.

The position with regard to the use of nitrogen on wheat is not so well defined as with phosphates. With wheat at 5s. 6d. per bushel, from which must be deducted about 1s. for costs such as threshing, bags, haulage, &c., an increase in yield of about 3 bushels per acre is

Harvesting experimental crops.

necessary to pay for the cost of fertilizer. As the average increase from the use of 1 cwt. nitrogenous fertilizer has been about 3¼ bushels, it is obvious that there must be severe limitations regarding its use. Better returns might be expected when the crop has followed one or two previous cereal crops, but the factors most definitely in favour of success from nitrogenous manuring are cold and wet winters, giving rise to sickly and yellow-looking crops in spring. On such crops, obviously suffering from nitrogen starvation, spring applications of either sulphate of ammonia or nitrate of soda may well result in large increases. Some crops of this nature were seen last spring, and top-dressing trials were laid down on them; the results of these will be published later.

It is said that farmers dislike a second manuring operation, and would naturally like to be able to put all the manure in with the seed. It will be shown, however, that nitrogenous fertilizers do not lend themselves to this method of application. The results to date from applications of 1 cwt. (150 lb. in 1936–37) sulphate of ammonia with seed are as follows:—

		Average Increase over No Nitrogen. Bushels.
1931–32 ..	3 experiments	3·4
1932–33 ..	18 experiments	0·9
1935–36 ..	2 experiments	4·1
1936–37 ..	5 experiments	4·2

In the last two seasons mentioned all the trials were on wheat following a stubble crop, and although some good results were obtained in individual trials, on others it was apparent that the fertilizer had caused germination injury. With the object of seeing how far a reduction of nitrogenous fertilizer would tend to lessen the risk of this injury, trials were carried out in 1936–37 with ammoniated super (a fertilizer containing 2 parts of super to 1 part sulphate of ammonia). In each of the five experiments carried out 225 lb. of ammoniated super was compared with 150 lb. super, and the average difference of 2·1 bushels in favour of ammoniated super could be ascribed to 75 lb. of sulphate of ammonia in the former. In one experiment there was definite germination injury of the ammoniated super plots.

In view of these results, it is not possible to recommend the use of sulphate of ammonia with the seed, and it is felt that the use of nitrogen on wheat is largely dependent on circumstances arising after the crop is sown. More will be written on the subject of nitrogen top-dressing of wheat at a later date.

A recurrence to a smaller degree of seedling injury which occurred in a number of crops last year has been noted in seedling mangels in the Wairarapa. The seedlings appear as if they had been lightly crushed just at ground-level, and the explanation would seem to be that surface caking is responsible. In one case noticed recently the mangels were sown on a paddock, half of which was out of grass and half of which had had potatoes in it the previous season. Those on the half out of grass, which presumably through having a higher humus content did not cake to the same extent, were doing very much better than those on the half which had had thorough cultivation previously.

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Fowl Leucæmia (or Fowl Leucosis).

L. W. N. Fitch, Assistant Officer in Charge, Veterinary Laboratory, Wallaceville.

THE condition known as fowl leucæmia has in recent years attracted considerable attention in various parts of the world. It has been reported extensively in America and many European countries, and in many parts is viewed with some concern. The condition is more popularly spoken of as "big liver disease," a term descriptive of its most consistent and conspicuous feature.

Actually there are several types of leucæmia which can often only be correctly named after careful microscopic study. These varying forms are now by common consent grouped under the all-embracing title "fowl leucosis." For practical purposes either of the above two titles are adequate.

The incidence of fowl leucæmia in New Zealand is difficult to assess, but there are indications that the disease is quite widespread. Cases have been examined at Wallaceville which have been received from districts representing most of New Zealand. Severe losses are rarely encountered, but it is probable that the total losses are not insignificant.

Leucæmia may best be described as a cancerous disease which produces its effect by burrowing into the vital organs of the body, destroying normal tissue, and replacing it by masses of cancerous tissue. The new tissue thus formed might be considered as resembling a parasite which lives and grows at the expense of its host. The valuable organs are gradually destroyed and replaced by masses of useless parasitic tissue. Furthermore, striking changes in the blood frequently occur, so that the bird suffers from anæmia and its consequent ill effects.

Fig. 2.—Enlarged liver from leucæmic fowl, and liver from normal fowl of similar weight for comparison. Note paleness of affected organ.

Fig. 1.—Bird experimentally infected and showing advanced symptoms of leucæmia.

Young birds appear to be most susceptible, and the greatest losses are experienced in pullets and young roosters.

Symptoms.

The symptoms of leucæmia are indefinite, and a description of them would apply equally well to a number of other disease conditions. A sick fowl is usually just a sick fowl, and it is rarely that a definite diagnosis can be made before a dead bird has been opened and examined.

One might say, however, that leucæmic birds, as a rule, fail to do well. If affected when young they do not thrive. Older birds become droopy and listless and then die. They may, however, die suddenly though in good condition, without any apparent previous illness. Frequently birds become anæmic towards the end, and their combs and wattles become very pale. They are weak and listless and eat but little.

The following result of experimentally infected fowls is striking: Of eleven six-weeks-old White Leghorn chicks, six were inoculated with infective material (liver suspension) and the other five were left uninoculated. All birds were fed and housed under the same conditions. Two

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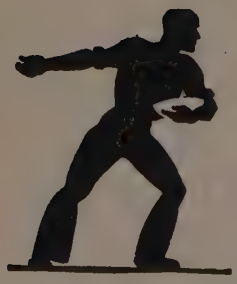

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months later three of the six inoculated birds had died of leucæmia and the average weight of the three survivors was 825 grams — obviously very sick fowls. The five uninoculated controls were quite healthy and weighed on the average 1,325 grams—a difference of 500 grams.

Post-mortem Examination.

The most striking feature when the bird is opened for examination is the liver. This organ is usually considerably enlarged and may appear to fill the abdominal cavity. The liver may be uniformly enlarged (as in Fig. 2) or studded with grey or white nodules (Fig. 3) from the size of a pin-head to an inch or more in diameter. In some cases, however, the liver appears quite normal.

The peritoneum, which is a delicate covering of the intestines and other internal organs, may, although this is less common, be covered with nodules, which are usually more flattened in character in this area (Fig. 4).

Fig. 4.—Intestines and peritoneum covered with flattened nodules.

After the liver, the organ most commonly affected is the kidney. Normally this organ has a bright, glistening, chocolate-coloured appearance. In leucæmia it exhibits a variety of changes, from merely appearing greyish and dull to becoming grossly enlarged and developing nodules as described in the liver (Fig. 5).

The spleen is almost always swollen, and, like the liver and kidneys, may exhibit nodule formation.

It is not invariable that all these organs are affected. Frequently the liver, kidneys, and spleen are all involved, but sometimes one or more organs appear normal.

In addition to the above-mentioned types, there may be tumour-formation in the ovaries or testicles, and tumours may be attached to the heart. Sometimes large, firm tumours are found in the abdomen, and sometimes masses of small ones. It is often difficult to determine their exact origin.

In addition to local tumour-formation, there may be small hæmorrhages throughout the musculature and even in the wall of the bowel.

Cause.

This is a matter on which we have no very definite knowledge at present. The tumour-like masses which form in the organs are derived from the blood-forming tissues which are mainly located in the bone-marrow. This tissue is in some manner stimulated to overproduction, and the products of this increased activity are deposited in various positions as indicated.

This overproduction of normal tissue with resultant tumour-formation is the main characteristic of cancer in man and animals. One very striking difference between the leucæmias of fowl and cancer of mammals is that in many cases the former are readily transmissible from bird to bird. In recent experiments at Wallaceville we have succeeded in infecting young fowls by inoculating them with liver emulsions from birds that have died from the disease. Further birds have been successfully infected with organ extracts from these experimentally infected ones. In this manner the transmissibility of the disease as it occurs in New Zealand has been established, and this fact, in conjunction with the results of microscopic examination of the tissues and other factors, shows the disease in this case to be similar to, if not identical with, that commonly occurring in other countries and known as myelogenous leucæmia. Further work is being undertaken to determine how infection occurs under natural conditions and at what age birds cease to be susceptible. It seems clear that young chicks are much more susceptible than grown fowls. The cause is now believed

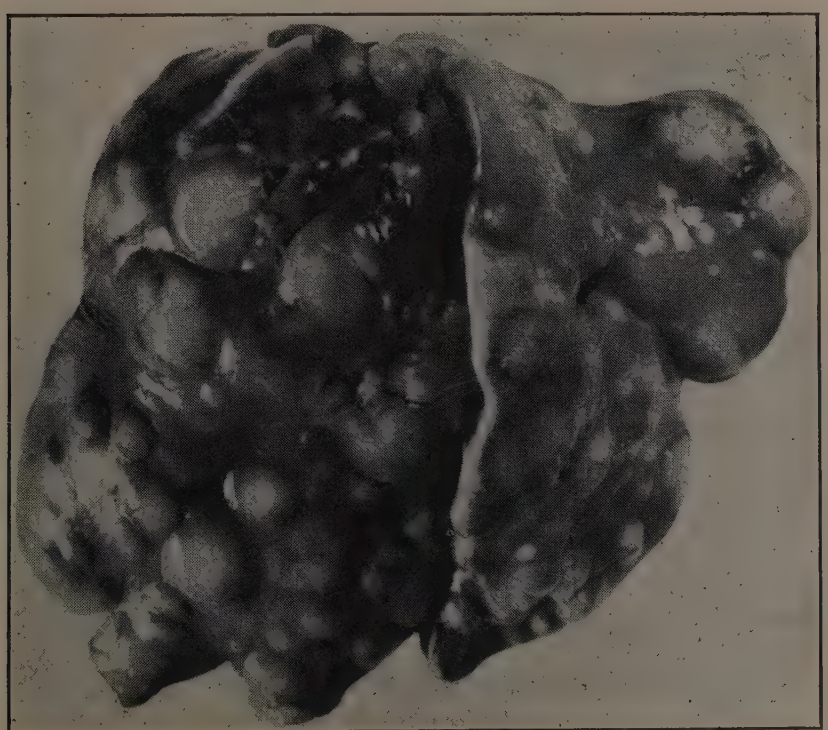

Fig. 3.—Leucæmic liver showing nodular type of swelling.

to be an infinitesimally small micro-organism, but the method of spread of the disease is not established.

Diagnosis.

This is based on the post-mortem changes as described. There is a possibility that a swollen, nodular liver might be due to tuberculosis. The Veterinary Laboratory of the Department of Agriculture at Wallaceville is eager to assist the poultry-farmer in the diagnosis and prevention of disease, and he should not hesitate to forward birds for examination.

Treatment.

One can recommend little by way of treatment, save to maintain a vigilant look-out for the condition and to destroy all affected birds. No medicinal treatment is of any value. One can only advise general preventative measures. The disease does not rank among the acutely infectious ones which cause spectacular losses. Nevertheless, in its insidious manner it takes its toll and contributes to the irritating annual losses that poultry-farmers have come to accept as inevitable.

However, something can be done. Prevention should be aimed at by burning all diseased carcasses and thoroughly disinfecting pens that have been occupied by infected birds. Obviously diseased birds should be killed and burnt, and special care taken in selection of breeding-stock.

Poultry-farmers are strongly urged to forward diseased birds to the Laboratory for examination, as it is only in this way that we can assess the importance of various diseases, and investigate them with a view to making recommendations for their prevention.

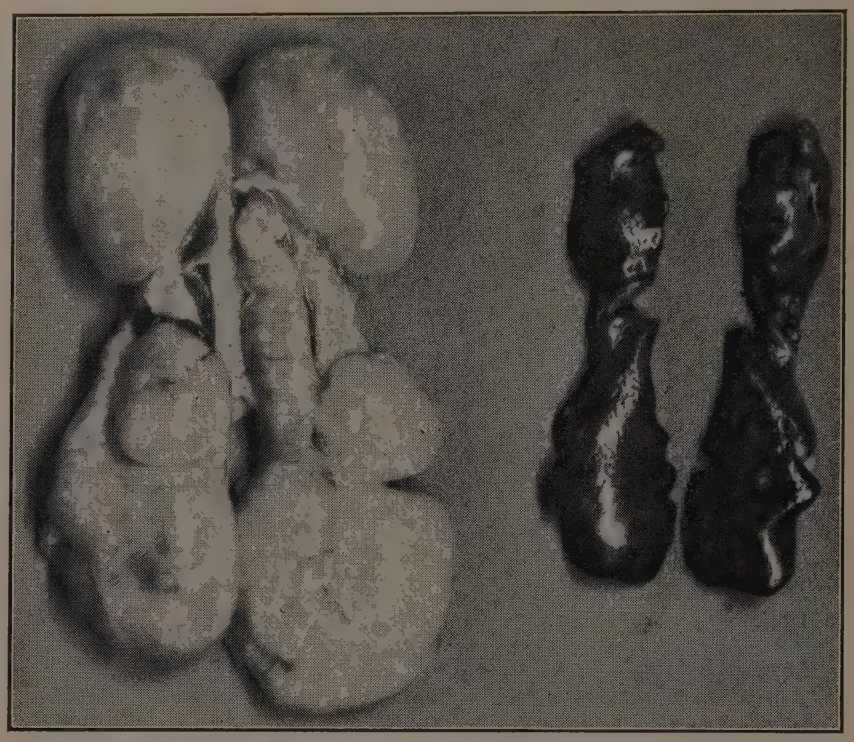

Fig. 5.—Kidney of leucæmic fowl and normal kidney for comparison. Note enlargement and paleness of diseased organ.

[*Photos by A. L. Bryant.*

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Importance of Good Seed in Pasture Establishment.

THE march of agricultural progress though perhaps not spectacular is nevertheless rapid and sure. Even only a few years ago the really first-class pastures to be found on certain farms were usually the result of chance, arising from a series of fortuitous coincidences. With the fuller knowledge of the subject now available good management can largely replace chance, and it can safely be said that the farmer putting land into grass will get the kind of pasture which he deserves. The element of luck is now practically restricted to the weather which may prevail after sowing, and even if conditions in this respect are unfavourable good management will insure the farmer against the risk of serious loss.

Briefly, the factors chiefly associated with the ultimate formation of a high-class pasture are—

(*a*) A good, well-prepared and properly fertilized seed-bed.

(*b*) A suitable seed-mixture, sown at the proper time.

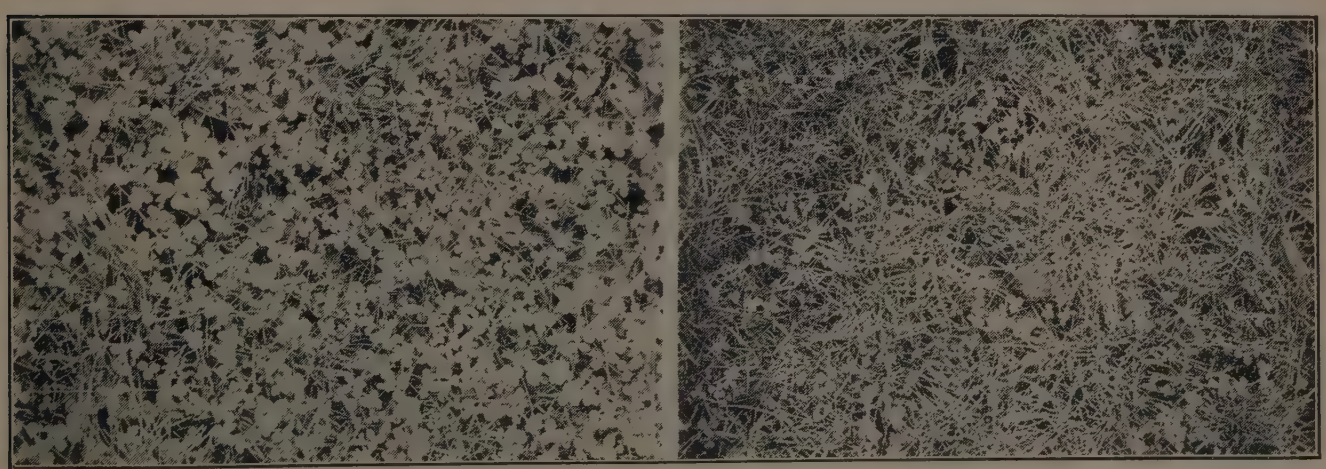
(*c*) The use of high-quality seeds.

It is rather surprising that while many farmers readily appreciate the fundamental importance of quality in the foundation stock for their flocks and herds, considerable quantities of inferior seeds are still being used. Certain mistakes in regard to the cultivation and sowing can be rectified by subsequent treatment, but if the mistake lies in the use of poor-quality seeds the pasture is definitely foredoomed to failure.

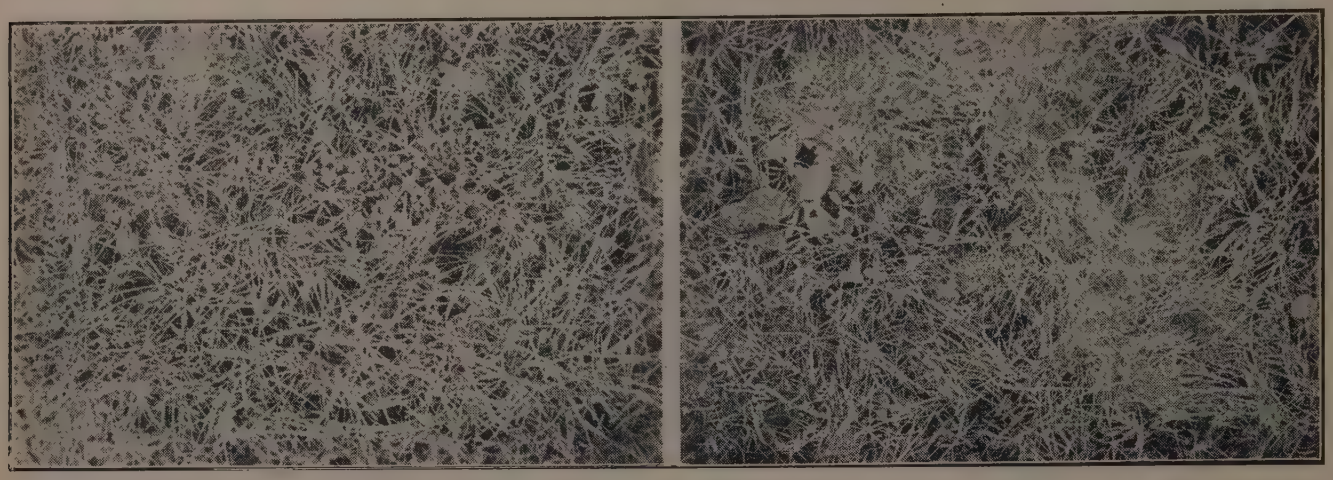
Now that the merits of certified seeds have been so frequently demonstrated and so widely proclaimed, ignorance cannot excuse, or low cost justify, the use of "cheap" uncertified lines of seed. In sowing down land to permanent pasture the bulk of the cost is represented by cultivations and fertilizers. Where good certified seeds are used, as compared with ordinary commercial lines, the increased cost will not exceed from 10 per cent. to 15 per cent. Yet the difference in the resulting pastures must be seen to be properly appreciated.

The accompanying photographs were taken on the students' demonstration plots at the Ruakura Farm of Instruction. In Figs. 1 and 2 the treatment and rates of sowing were identical, but certified white clover was used in Fig. 1 and Dutch white clover in Fig. 2. The certified clover not only gives a heavier yield, but also reflects its value in the greater vigour of the rye-grass resulting from the plentiful supply of nitrogen which the clover makes available. The difference in cost of these two pastures amounted to only 5s. per acre.

Figure 3 shows a sward of pedigree perennial rye-grass and pedigree white clover, the seeding being at the same rate as was used in Fig. 4 which, however, was



FIGS. 1 and 2 show a comparison of certified and uncertified white clover.



Figs. 3 and 4 show a comparison of certified and uncertified strains of rye-grass.

sown with certified white clover and uncertified perennial rye-grass. It will be seen that the rye-grass in Fig. 3 forms a dense and vigorous sward, while the sward in Fig. 4 is thin, weedy, and generally poor and unthrifty.

The difference in actual cost of establishment of these two pastures was only about 12s. per acre, and a comparison would satisfy any farmer that the money has been invested rather than spent.

—P. S. Syme, Ruakura.

Ragwort in Canterbury.

RAGWORT, fortunately, is still a very uncommon weed in Canterbury, and to most farmers in this province it is little more than a name. However, its presence in Canterbury has definitely been established, isolated patches having been found at Le Bon's Bay, Little River, Tai Tapu, Ouruhia, and at Culverden.

In all cases where the existence of this weed has been confirmed farmers have been instructed to see that all plants are destroyed, and advice as to the best means of eradication has been given.

Through lack of knowledge of its appearance there is the possibility of plants escaping notice. Ragwort is really a very distinctive plant, especially in the flowering stage, and once seen is not likely to be forgotten. In the early stages of its growth it forms a rosette of lobed leaves somewhat similar to those of groundsel, and then sends up a tall seed-stalk which may be anything from 2 ft. to 5 ft. in height. The flower-head consists of a cluster of yellow daisy-like flowers, the individual flowers measuring about 1 in. across.

The only plants at all likely to be confused with ragwort are giant groundsel, tansy, or St. John's wort, all of which have yellow flowers. These weeds, however, differ quite considerably from ragwort. Giant groundsel, for instance, has a narrow tubular flower which has no disk in the centre. Tansy has finely divided carrot-like leaves and a strong odour. St. John's wort, which incidentally is becoming a serious pest in parts of North Canterbury, where it is invading pastures, has a creeping underground stem as in the case of twitch, and very small narrow leaves about ½ in. long which are closely attached to the stalk. Its yellow flowers are characterized by the presence of dense tufts of yellow hair-like stamens. As in the case of groundsel, there is no yellow centre in the flower, and it has only a few petals. There are a number of daisy-like plants such as ox-eye or dog daisy, chamomile, &c., which can easily be distinguished from ragwort by their white petals.

A detailed description of ragwort has already been given in the February issue of this *Journal*. Where there is any doubt whatever, plants should be forwarded to the local Instructor in Agriculture for identification.

Ragwort is a very prolific seeder, a single plant being able to produce many thousands of downy seeds, which may be distributed by winds for many miles. It is capable of growing from portion of a root as in the case of dock, so that pulling is not a completely effective method of eradication. The only certain way of getting rid of this weed is to dig the whole plant out with a spade or relieve the soil about the roots and then pull it out.

It should be remembered that plants pulled out when in full flower may, if left about, be sufficiently matured for the seed to ripen off. For safety, therefore, they should be burned.

—L. W. Blackmore, Christchurch.

Acting on the advice of the Fields Division several areas of fern-clad sandhills in the Wanganui district were, after the burning of the bracken, sown with subterranean clover and superphosphate. These lands are now stocked with ewes, lambs, and dairy cows; young fronds of fern do not get beyond the curl stage, and ere long, with heavy stocking and subsequent consolidation, will be entirely eradicated.

Some remarkable wheat-yields, considering the season, have been produced on the heavy land in the Marlborough district. The early part of the season was very dry, and this in many cases caused a drop in yield. However, at Stoney Creek, a yield of 81 bushels of Cross 7 was obtained, while others of 78 and 72 showed that this performance was not a freak. Generally speaking, the average this year is high—on the heavy land about 40 bushels to 45 bushels.

Suppression of White Clover.

THERE are in the Ruakura Grazing Trials twelve pastures, each managed differently. In February, 1937, they were identical, for they were then not twelve fields, but one. In February, 1938, while far from identical, ten of them have plenty of vigorous white clover, but the other two are sadly deficient in white clover, and what little is there is not at all vigorous. These two fields were both hard-grazed in the winter and early spring and then closed for silage. Each received 3 cwt. of super and 3 cwt. of lime in the autumn, and one received the same again in the spring; yet there is no great difference between them. At first, this seems strange, for the other fields not cut for silage which received extra super are responding to it extremely well. Furthermore, hard-grazing in the winter and early spring encourages white clover. Definitely white clover would now be vigorous in these two fields had it not been for the early shutting-up for silage. Even hay would not have been so depressing. What happened is this: The white clover was suppressed because it could not compete with the partial smother by the grasses in October *when it wanted to make its annual rush of leaf-production.* The fields were closed for silage on the 1st September, and by the time white clover felt the urge to make rapid active growth it was too late—the grasses had too much of a lead.

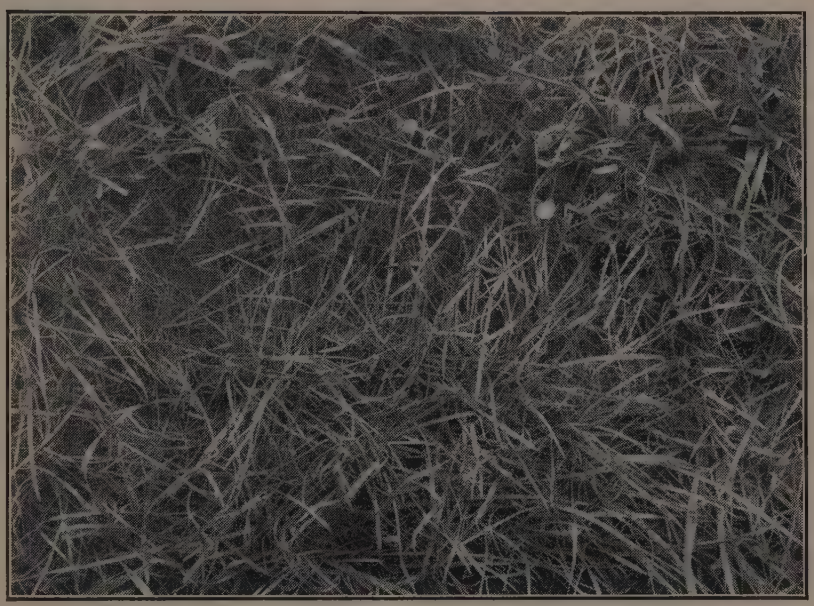


Fig. 2.—Hard-grazed in the winter and early spring and closed for silage on 1st September. White clover suppressed by smother at its most critical time. Photo taken 17th February, 1938.

The aftermaths from these crops were good—white clover produced quite a fair bite in November and December; but it could not keep it up in January and February for it had been severely checked *at its most critical time.* Unless a pasture plant is allowed to develop its root system and to build up food reserves at the time of its most active growth it is weakened for leaf-production at later periods when conditions are unfavourable for growth (*e.g.*, dry summer).

Not all early silage crops will bring about a summer slump in white-clover production. Only when the sward is very dense does this occur. The fields which were leniently grazed in the winter and early spring and then shut for silage on the 1st September suffered no ill effects, the reason being that lenient winter grazing causes an open sward. Hard winter grazing, on the other hand, makes a dense sward. It is dense smother that prevents white clover from being productive.

So if you have too much white clover in a pasture, and there are places where this occurs, you will know what to do to bring about a reduction for summer and autumn grazing, and, what is more likely to be generally useful knowledge, if you cannot afford to allow reduction of white clover to occur in a pasture, do not close it for silage at an early date after hard grazing in the winter and early spring.

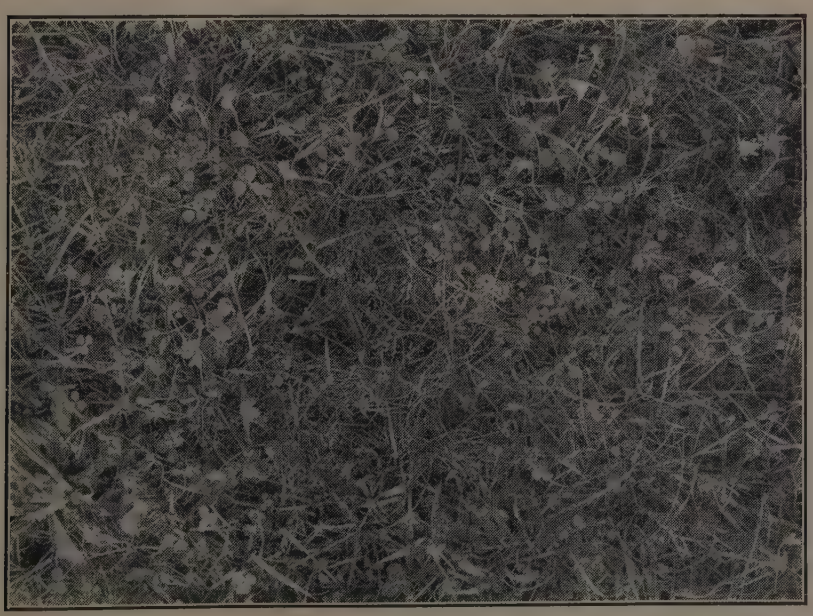


Fig. 1.—Hard-grazed in the winter and early spring, but *not* closed for silage—rather leniently grazed in October and November. Photo taken 17th February, 1938.

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Method of Potato-planting.

A DEPARTURE from the usual methods of potato-planting is adopted by Mr. L. T. Wright, a farmer in the Annat district.

The implement, which is made up largely of parts taken from obsolete implements or old iron about the farm, is built to accommodate three men, who plant the potatoes by hand.

A strong iron frame is fitted over two old mower wheels, the necessary axle width being obtained by welding together two disused mower axles. A large wooden box or trough divided into three compartments for holding the seed is fitted across the front of the frame. The bottom of each compartment is so constructed that the potatoes feed readily through an aperture at the back of each compartment into shallow troughs.

A strong tine fitted with a suitable shoe for opening a channel in which to plant the potatoes is clamped on to a cross beam immediately behind each small trough. To the back of the these tines and fitted close up to the ends of the small troughs previously mentioned are downpipes constructed of sheet iron tacked on to a background of wood. On a bench immediately behind these downpipes old mower seats are bolted to accommodate the planters.

Planting is done by hand, each man dropping a tuber into the downpipe when a piece of iron fitted to press against the spokes of the transport wheel indicates by the clicking sound made that it is time to do so.

The implement is tractor drawn, and a light mould is raised over each row planted by two extra tines clamped to the back beam of the frame.

There is no manurial attachment. Fertilizers are either broadcast prior to planting or drilled into rows when planting operations are completed.

—J. G. McKay, Christchurch.

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Weeds in Seed-bed.

IN endeavouring to rid the surface soil of annual weeds preparatory to sowing those comparatively slow-establishing crops such as lucerne, a not uncommon error is that of giving the land unnecessary grubbing just prior to sowing the seed.

Grubbing at this stage not only results in bringing fresh weed-seeds to the surface at an undesirable period, but also by its action in practically ridging the surface soil encourages evaporation of moisture at a time when its conservation is of considerable importance. Only in exceptional circumstances should it be necessary to use the grubber at the period mentioned. If earlier cultivation has been deep and thorough, the only implements which should be required to complete cultural operations before sowing are the roller and tine harrows used in the order mentioned—that is, use the roller to compact the top soil—thereby encouraging the germination of weeds near the surface, and the harrows to eradicate them.

Normally, from a week to ten days should be allowed to elapse between rolling and harrowing. Weed seedlings will by then have reached a stage at which harrowing at intervals of from one to two days will, under dry conditions, effect a good kill. In most cases these operations may be repeated, if necessary, without unduly consolidating the top soil.

—J. G. McKay, Christchurch.

Establishment of Cocksfoot in Pastures.

THE establishment of cocksfoot in pasture mixtures on areas of medium to low rainfall has always been a difficult problem. Cases have been observed where a mixture of 25 lb. of rye-grass, 10 lb. of cocksfoot, 2 lb. of white clover, and 2 lb. of crested dogstail have been sown and it has been found that the cocksfoot takes from two to three years to become firmly established. In actual practice the cocksfoot sown at this rate per acre is invariably thin, and when the rye-grass begins to run out there are not sufficient cocksfoot plants left in the sward to warrant leaving the area in pasture.

One method of overcoming this difficulty has been to recommend an increased amount of cocksfoot—namely, 20 lb. per acre. With the increased amount the cocksfoot makes quite a reasonable sward along with white clover and rye-grass, but even with the increased quantity of seed the plants still take from two to three years to become firmly established.

Recently it was suggested to a farmer who had had difficulty in the past in establishing cocksfoot successfully to drill the cocksfoot. The following mixture was used: 15 lb. of rye-grass, 15 lb. of cocksfoot, and 5 lb. of Montgomery red clover, together with 10 oz. of turnips. The cocksfoot and turnips were drilled with 1½ cwt. of reverted super, and the rye-grass and Montgomeryshire red clover was broadcast. The area was sown early in January, and when inspected six weeks later there was an excellent strike of all species, the cocksfoot plants being as well grown and as firmly established as the rye-grass. A further inspection of this area was made recently, and the cocksfoot has stood up to the grazing very well indeed. Under the above system the cocksfoot was far enough advanced to withstand the grazing by sheep.

With the broadcasting of cocksfoot, the rye-grass is ready for grazing long before the cocksfoot, and in the feeding a large number of cocksfoot plants are pulled up and kicked out by the stock, so unless a heavy seeding of cocksfoot is used in the mixture to allow for the heavy death-rate a poor establishment results.

The drilling of cocksfoot for seed purposes together with white clover can be recommended, but on no account should red clover be included, because the red clover will be in full growth when the cocksfoot is ready for harvest, and where a binder is used for harvesting the clover gets into the butts of the sheaves and makes it difficult to get them dry for harvesting.

—*C. C. Leitch, Timaru.*

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Crops for Wintering Store Pigs.

With the rapid decrease of the skim-milk supply in the autumn the dairy-farmer is confronted with litters from sows that have farrowed too late for the young pigs to be fattened as porkers. If he disposes of these litters at the saleyards they fetch only a few shillings. If the farmer can maintain these litters for the three winter months in a healthy condition and in a cheap manner they are a valuable asset in spring.

The cheapest method is undoubtedly by the use of small quantities of meals, together with cheaply produced home-grown root crops. These home-grown crops form the bulk of the ration and give perfectly satisfactory results.

Root crops such as swedes and mangels, together with carrots, potatoes, and pumpkins, may be used with success. The crop to grow depends on what is most suited to any particular district. Where it is possible to grow more than one crop—*e.g.*, carrots, pumpkins, and mangels—the pig-farmer can "finish" a line of baconers with carrots as part of the fattening ration, and without which he must use expensive meals or sell the pigs at undesirable weights. Carrots are ready early in the season, they are palatable and readily consumed by any class of pig, and their vitamin content makes them valuable to young pigs in particular. Pumpkins, swedes, mangels, and artichokes are ready for use later than carrots, and the ideal method is to have small areas of pumpkins, &c., giving a succession of crops. An idea of the area to grow may be gathered by keeping in mind that every store pig requires about ½ tons of roots for three months' feeding, and a sow about ⅓ ton for the same period.

Where maize can be grown a small area of this crop is a most valuable asset. Small quantities—*e.g.*, 1 lb. to 1½ lb. per pig fed with roots to pigs on cow pasture allows them to obtain their protein from grass, of which maize and roots are deficient. Where the pigs are stied or run on small areas of land, then ½ lb. of meat-meal in place of ½ lb. of the maize is the better practice. Under either set of conditions the pigs thrive and give an excellent return for root crops grown. Trials carried out at Ruakura with meat-meal and roots show a return of to 65s. per ton for roots consumed after the cost of meals has been deducted, and it is difficult to find an alternative return on a dairy-farm that is superior to that of growing root crops for pigs.

—C. E. Ballinger, Ruakura.

Preparation of Ground for Early Potatoes.

The early-potato crop requires a well-drained, deeply-worked, friable soil. Frequently one hears that the soil need only be in a rough state preliminary to the planting of potatoes. This opinion is often expressed by people who grow only occasional crops, and instances are often given of excellent crops of potatoes which have been grown under these conditions. Nevertheless, farmers who grow potatoes for a living invariably aim at a well-cultivated bed for the planting of potatoes, and there appears no doubt that the excellent crops which have resulted in spite of poor preliminary cultivation would have been still better if the soil had been worked to a finer condition before planting.

The desirable fine state of the soil necessary for the steady advance in growth of the potato is more easily attained prior to planting. It is almost impossible to bring about this state of the soil after the potato has been planted, without disturbing the young potato plant and so causing injury to its fast-spreading rooting-system. After a previous crop has been removed or after a bare fallow the ground for early potatoes should be ploughed deeply, worked to a fine state with diskings, and reploughed if necessary and further disked and tine-narrowed till the soil is in a fine friable condition.

If the area carries a green crop it should be ploughed at least six weeks before planting-time to allow of decay of the vegetation, and just prior to planting well worked with disks and harrows. If time does not permit of this programme no preliminary cultivation can be carried out and the area must be left till planting-time arrives, when potato-seed and green material are covered with one operation of the plough. If the land is carrying old pasture the ground should be skim-ploughed in March, left for a few weeks, and the sod then disintegrated by disking shortly before the first deep ploughing. Further workings with disks and harrows then should bring the soil to the desirable friable state. If this aim is not achieved easily there should be no hesitation in giving the ground another ploughing.

—J. E. Bell, Auckland.

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Fascine Drains.

MOST farmers recognize the value of drainage for improving the productivity of wet land, whether flat or sloping. The advantages accrue not only from the more healthy condition of the soil for the growth of the better pasture-plants, by the consequent lowering of the water-table, but also from the reduction of poaching by the feet of stock.

For grazing land covered drains are preferable, and of these the manuka fascine type of drain, which lasts for ten years or more, is very satisfactory where tile or mole draining cannot be entertained.

A farm-drainage scheme usually consists of a main drain with a number of laterals, and the first consideration in planning such a scheme is the provision of a suitable outlet to carry the water away from the lower end of the main drain. This outlet is usually obtained by leading the main drain into a river or stream, or by connecting up with some larger district drainage system. The success of the undertaking depends largely on the efficiency of this main outlet, so that its careful planning is most essential.

The main drain should follow the lowest natural drainage-line of the area to be drained, and may be either an open or a covered drain. The lines of the lateral drains may be struck out with a plough and the furrow slice graded back. A second and third furrow slice may be taken out and graded back. The rest of the drain is dug with a draining-spade, commencing at the outlet and digging the full length of the drain to only half the depth that the finished drain will be, and is not taken to its full depth until the ground is wet enough for the flow of water to give a guide in obtaining the correct fall.

Fig. 2.—Outlet for a manuka fascine drain.

The section of a fascine drain is V-shaped, being usually 2 ft. to 2 ft. 6 in. across the top and 2 ft. to 3 ft. deep. Fascines are made by trimming the brush off the sides of tall, thin, straight manuka and tying the sticks into bundles 6 in. to 9 in. in diameter. The brush is tramped into the bottom of the V, and the bundles or "fascines" laid on top, starting at the higher end of the drain, with the brush-ends pointing up the drain and overlapping the butt of the previous fascine. Sometimes the brush end of the fascine is sawn off and the fascines laid butt to butt.

The layers of soil should be replaced in the order in which they were removed, taking care to tramp each layer very thoroughly to prevent the silting-up of the fascines at the first rain, which would occur if the soil were loosely packed. The turf should be replaced on top if the drain has been dug through a grass paddock.

—E. Moss, Assistant Instructor in Agriculture, Kaitaia.

Fig. 1.—Manuka suitable for fascine making.

In North Canterbury a spring top-dressing with equal parts of super and sulphate of ammonia at 2 cwt. per acre has given a very good response on a paddock of Italian rye-grass which has been saved for a seed crop. It is estimated that the increase in the vicinity of 5 bushels to 10 bushels per acre, which should be quite a payable proposition. Part of the paddock not top-dressed is short, whereas the top-dressed portion will be a handy crop to reap with the binder.

A farmer in the Strath Taieri district always makes a practice of ridging his swede-seed in immediately after a light disking. He claims that by doing this he obtains a moist ridge rather than a dry ridge, which is likely to be formed if the ground has been harrowed or left uncultivated for several days previous to ridging. For the last twelve years he has not had to resow his swedes, whereas his neighbours have had to do this fairly frequently.

Management of Ewes on North Island Fat-lamb Farms.

On the average North Island fat-lamb farm the rams are put out during March, so that lambing will begin with the earliest grass growth in the spring. Earlier mating and earlier lambing is not desirable unless special supplementary feed is provided to make up for the shortage of grass; early lambs which receive a check through the ewes being poorly fed or from bad weather are late in fattening.

Flushing prior to mating is a sound practice and leads to a higher lambing percentage. Flushing consists in feeding the ewes on good pasture, the change from dry to succulent feed invigorates the ewes, and they come in season more quickly and surely. Unflushed ewes come in season later and may return to the ram two or three times and may be missed towards the end of the season.

The pregnant ewe should be reasonably well fed from tupping onward so as to build up as much reserve condition as possible with which to nourish her unborn offspring. In the average season top-dressed pastures usually supply sufficient sheep feed until about mid-June, when grass-growth practically stops. Under good management provision is usually made by shutting up one or two fields where the grass is rationed or crops such as swedes, turnips, black barley, or Italian rye-grass are grown. These crops, in association with the cleaning-up of unpalatable, indigestible roughage which is the major winter feed on most farms, keeps the ewes in a healthy condition without undue loss of weight.

Exercise for the pregnant ewe is most essential, more particularly if special crops are grown. Regular moving from one paddock to another is beneficial, as the ewes get lazy before lambing and the fact of moving through the flock is not sufficient. They should be definitely moved, the shifting giving the necessary exercise and avoiding undue urine retention, which is common in sheep that are lame or in overfat condition.

Crutching should be done as late as possible so that the ewes will be reasonably clean at lambing-time. Careful management of the ewes at this stage is most necessary, or losses through abortion may occur if the sheep are at all roughly handled.

—*J. F. Shepherd, Hamilton.*

An area of 10 acres situated in the Rimutakas at an altitude of approximately 2,000 ft. is showing strong subterranean-clover establishment. This area has aroused considerable interest, and from contact with neighbouring farmers it is evident that in this locality a very definite increase in the sowing of subterranean clover can be expected.

A poor pasture in Canterbury, which was running out to danthonia, was top-dressed with 2 cwt. of slag last autumn. When visited in November there was an excellent white-clover growth and perennial rye-grass was showing up quite well.

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Winter Feeding in Southland.

THE problem of winter feeding will be exercising the minds of most farmers this month, although the majority have sown a catch crop, to obviate as much as possible the necessity of utilizing any roots that may be available. The feeding of roots does not occur in a normal season until June.

It may be worthy of note that a number of farmers who do not sow any special lamb-fattening feed run the lambs over the swede-tops. Some farmers have been doing this for years without detrimentally affecting the bulb development of the swede, but fattening many lambs. The number of lambs put on to the tops is generally between two to four per acre. It has been noticed on some areas where this practice is followed that the lambs tend to consolidate the ground around the bulbs, so that they are less knocked out and damaged by the flock when general grazing is undertaken later.

Dry feeding will be fairly general, particularly for unfinished lambs and any being kept for flock replacements. It usually takes some time for lambs to take dry feed, and it often helps to run a few old ewes with them, to set an example and lead them up to the feeders. Regarding dry feed, there is some difference of opinion as to whether oats, if these are being used, should be fed whole or crushed, or oats added to chaff. Feeding whole oats is often dangerous, particularly if the lambs have access to plenty of water afterwards. The big, strong lambs are inclined to gorge themselves, and, after drinking, the oats swell, with the result that the heaviest losses are in the best lambs. There is not the same danger when crushed oats are used or if whole oats are mixed with chaff. If it is found difficult to get lambs to take chaff, a little fine salt sprinkled on the top of the chaff in the feeder will often prove helpful.

Various methods are adopted for dry feeding. Generally, wooden troughs are placed in the paddock or the larger, roofed type of self feeder used. These hold a number of sacks of feed at a time, and the trough is automatically replenished as used. These methods are satisfactory for smaller flocks, but for larger flocks, say, four hundred and upwards, a 90-yard-long bolt of New Zealand flax canvas, 28 in. wide (the same material as is used for wool-bales, &c.), may be procured, or old manure-sacks may be cut and joined together to make this length. This should be stretched between two rows of short posts driven into the ground so that the feeder is at a height of about 18 in., and wire stretched on either side of the length. To this is attached the material. This makes a very useful feeder for a large flock. It should be erected in a sheltered position and in such a place that the sheep will approach it from one end as they enter the paddock—*i.e.*, so that they approach on both sides and do not have to jump over or into the feeder.

Farmers generally will be well advised to be sure that there is ample winter feed for the stock before threshing and disposing of any oats this year.

—D. Faithful, Gore.

Certified Giant Rape.

THE advantages of sowing true-to-type rape in preference to using that of commercial origin are well brought out by a glance at the illustration provided.

The rape illustrated was that produced by sowing certified giant rape seed and that from ordinary seed. It can be readily seen that the certified rape has produced a growth definitely superior to that of the commercial variety.

Heights of growth can be compared by observing the photograph in which the two men are standing, one in the certified and one in the ordinary rape.

In addition, it will be noted that where the certified rape has been sown there is little or no weed growth, while in the other fat-hen is visible above the leafage.

Most commercial rape consists of a mixture of types, some of which are lax in growth while others resemble chou moellier. Some types flower early, others late; some recover quickly after feeding off, and others produce no further leafage. These facts obviously detract from the value of the plant as a whole, and the feed produced is not all it should be.

The man on the left is standing in a plot of rape sown from ordinary seed; the man on the right is surrounded by plants grown from certified seed.

Certified rape, on the other hand, has been evolved by selecting a certain type from among the heterogeneous mass found in commercial varieties. It is as a result of this work that certified rape, when sown, is able to produce plants which are true to that type which has been selected on account of its desirable properties of recovery after feeding, bulk of feed, &c.

The importance of trueness of type has been well demonstrated in connection with potatoes and rye-grass, and it is for similar reasons that true-to-type rape should be sown.

—J. A. S. Miller, Timaru.

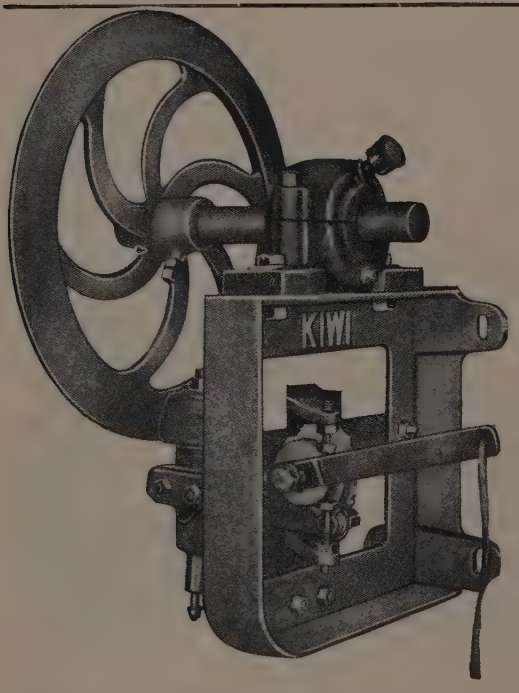
Arresting Sand-drifts.

IN many areas of New Zealand wind-blown sand is encroaching upon farm lands. This is particularly so on the West Coast areas, which are exposed to the prevailing westerly winds.

Sand thrown upon the shore by the sea is carried inland by the winds, where it accumulates as dunes, which move steadily forward. In a humid climate, such as New Zealand, sand-dunes, if left undisturbed, become fairly rapidly fixed by the natural growth of vegetation upon them. It is certain that the area of fixed dunes was much greater before the vegetation and surface was disturbed by man with his fire-stock and by introduced grazing animals. Sand-drifts formed in this way ruin much good farming land and, owing to gradual destruction of vegetation on the ground over which they pass, much sand country that was formerly fixed is left exposed to the mercy of the wind.

Fig. 1.—Drifting sand advancing on to fixed sand country capable of carrying a first-class sole of grass.

The drift once started tends to accumulate (Fig. 1), and prompt measures should be taken to arrest its progress. Fast-growing sand-binding plants are necessary to stop the encroachment of sand-drifts. Of these, the most valuable are lupins, which grow naturally in front of the drift, and marram-grass, which is planted on the face of the moving sand itself. Rooted cuttings of marram-grass are planted in rows 4 ft. to 6 ft. apart, as shown in Fig. 2. The cuttings establish quickly, and as the sand continues



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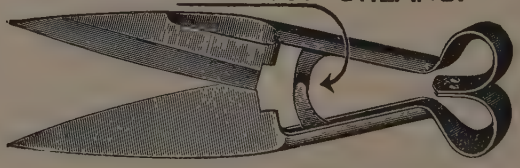

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to blow over them they grow so rapidly under these conditions that they develop into large plants, keeping their foliage well above the surface of the sand. Ultimately they form a complete cover and arrest the encroaching drift.

In front of the marram-belt lupins flourish protecting the surface, collecting around them sand blown from off the drift. Lupins are short-lived plants, and as they die provide humus, which raises the fertility for incoming pasture plants.

Drifts once fixed in this manner should be carefully protected from fire and from damage by wandering stock. Once a firm sole of pasture has been established it requires careful management, and any opening-up of the sward should be quickly remedied to prevent wind-erosion.

—*J. B. Stanvill, Whangarei.*

Fig. 2.—Method of arresting drifting sand by vegetation. Bare sand-drift in left background. Freshly planted marram-grass in the middle distance. Older marram plants arresting sand encroachment on right. In foreground sand fixed by lupin.

Necessity for Lime in Marlborough.

One of the most arresting features of farming in Marlborough is the surprisingly small use of lime and fertilizer with crops and pastures as compared with other districts of similar climatic conditions. Official figures show that of the 139,000 tons of lime railed in the 1935–36 season, only 410 tons were railed in Marlborough.

The district is well endowed with lime outcrops, and official tests conducted by the Fields Division of the Department have shown many of these to be of high quality. Given a good supply of cheap, high-quality lime, there is no doubt that many of the pastures and crops in the district will benefit considerably. Pastures which have been originally sown down in good English grasses and have been allowed to deteriorate through lack of proper manuring are abundant in the district—this, despite the fact that numerous trials by the Department of Agriculture have shown that an excellent response is obtained by the application of lime and fertilizer. On the other hand, it has been ascertained from the farming community that most progressive farmers are desirous of applying lime in quantity, realizing full well the benefits that can be obtained therefrom.

The answer to this riddle lies in the present price of lime, which is too high, and the supply, which is inadequate. There is no doubt that, given a cheap, high-quality lime-supply, the amount of lime applied in the district would be vastly increased in a single season. Evidence of the necessity for this supply is everywhere, and farmers agree that one of the best things for the district would be the establishment of an economically sized lime-works.

—*D. R. Wilkie, Blenheim.*

Blackberry Control by Crushing.

On a section of unploughable land a good control of blackberry was effected by the use of tractor-drawn disks. This piece of land, about an acre, was unploughable because of thick gorse and willow roots. The growth of blackberry was rank and straggling, and was kept somewhat green by the shade of willows, making it very difficult to obtain a good burn. The growth was considerable, and extended well over the fender of the tractor, so that not much impression was made by the first run over, but after the disks had been drawn over the patch three or four times the stems were rolled down and cut up to some extent. In about a week the patch was browned up and carried an excellent burn. The disks had cut the surface soil to some extent, but a little more depth was obtained by the use of a ridged-tire cultivator. A cover of rape and oats was sown on this and has given a fair bite of feed, which will attract the stock on to the young blackberry and give it a further severe check.

When it is sufficiently under control a cover of grass will be sown. The farmer hopes eventually to be able to plough this piece of land and completely stamp out the blackberry. In the meantime the above method has given satisfactory results. On unploughable land, or on ploughable land where it is difficult to obtain a burn sufficient to give clearance to the plough, this method could be used with good results.

—*W. R. Lobb, Dunedin.*

The result of the first draft of lambs at Winton Experimental Farm on the certified trial versus best Southland old pasture was as follows: Best Southland old pasture, 13 lambs prime out of 43; certified rye-grass, 28 lambs prime out of 48. This is equivalent to 30 per cent. against 58 per cent.

Eradication of Rushes.

RUSHES are a common weed on wet pasture land, and occupy space that should be growing grass. Rush-clumps extend outwards by short rhizomes which spread vigorously in a weak, open sward or where a pasture is constantly grazed bare. Practical control can be obtained by making the soil conditions more favourable for vigorous pasture-growth and less favourable for rush-growth. Drainage should be improved, and if necessary a number of underground drains constructed to tap water from low-lying places. The removal of the rush-growth in the summer then follows, either by spading or by frequent mowing. In spading, a slightly larger sod than is covered by the rush-plant is chipped off to a depth of 1 in. to 2 in. The sods are then turned to the sun to dry out. They may be subsequently burned or carted away. Bare spaces and small hollows which fill with water result from this practice. Weeds, and even rushes, again occupy the bare ground before pasture-plants can spread and establish. Frequent mowing, particularly after mid-summer, has a weakening effect on rushes. Top-dressing and liming then should follow to obtain a vigorous growth of pasture-plants and to encourage *Lotus major*, which will do well on land where rushes are troublesome. The area should then be spelled to obtain a long growth both around and in the rush-clumps, and then be eaten down rapidly by cattle. The long grass prevents the spread, and the cattle in grazing among the weakened rush-clumps will break down and eat much of the rush-growth along with the pasture. This combination of mowing, top-dressing, and grazing will control the rushes until there remains only a few weakened plants, which make no material difference to the production of the pasture.

—*E. H. Arnold, Dargaville.*

Fig. 1.—A heap of spaded rushes. Spading removes considerable soil with the plants, and leaves bare hollows in the pasture sward. Disposal of the rush sods is also difficult.

Fig. 2.—Clumps of rushes weakened by mowing. Further cutting followed by top-dressing to encourage pasture growth, especially of *Lotus major*, will finally control these plants.

Cabbages and Cauliflowers for Winter Supply.

CABBAGES and cauliflowers in the seed-bed should be lifted carefully so that the little roots are disturbed as little as possible. This is attained by levering the plants up with a fork or spade. Each plant and its ball of earth should be separated by hand and transplanted immediately.

Transplanting should take place just before sundown, so that the young plants have a shorter period of sunlight in the first few days, when the roots are making fresh contact with the surrounding soil. Showery weather or overcast skies make for quicker recovery of the plants, for hot sunshine wilts them. For ease and speed in transplanting a dibbler or a trowel is a handy implement, although the hands alone make a much better job. A hole is made, the plant's roots put in this hole and fresh fine soil brought in close, intimate contact with the roots, taking care that there are no air spaces.

If the soil and weather conditions are dry the plants should be placed an inch or so deeper in the soil than it was in the bed. If the soil conditions during the future growth of the plant are expected to be wet the cabbages or cauliflowers should be planted on low ridges, if otherwise, on the flat.

Cabbages or cauliflowers should be planted 18 in. to 21 in. apart in rows about 27 in. apart. Watering to strike

the plants should be avoided if possible. However, often the soil is dry and the plants must be given water soon after transplanting, or they will suffer considerably. This watering should be carried out in the evening, and within the next day the moistened soil should either be covered with a mulch of soil or other material or later on broken up with a hoe. If left, a crust may form on top of the soil affecting adversely the growth of the plant.

Always apply the water gently to avoid damage to the roots, and always apply just sufficient water to moisten the soil around the roots.

—J. E. Bell, Auckland.

Eradication of Niggerhead or Giant Toe-toe.

THE sedge illustrated in Fig. 1 is a problem to farmers in the Wairoa district of Northern Hawke's Bay. It is known as toe-toe. The sedge is not palatable to stock, and crushing with cattle is severe on stock and not successful, as the plants, when eaten off hard, rapidly grow again. The usual practice when an area is invaded by the sedge is to plough and crop with the idea of eradicating the plant. A common method is to plough in the late summer, roughly cultivate, and sow to oats or barley, which are fed off in the spring while the land is wet. The land is reploughed for rape in October or November and immediately sown. After the rape, which is often fed off late, the land is again ploughed, hurriedly worked, and sown to grass. With the late sowing and hurried working, grass and clovers are slow to cover the ground, and sedge-plants return too thick to cope with by spading out. The reason for the failure of such methods and even more ploughings, is not far to seek. After each ploughing and hurried cultivation the sedge-plant, which has a very strong matted root difficult to kill, is left undisturbed and re-establishes from pieces of root and from seedlings. Each succeeding ploughing does no more than roughly bury the plants. A method which is successful with the ordinary rush of stiff clay soils, can be counted on to reduce the toe-toe or giant sedge to an amount which can be dealt with by the spade after the pasture is established. The land should be ploughed in the spring or early summer after roughly cutting the sedge and burning off as much as possible of the top growth. A swamp plough with chain attached does the best job. A 10-in.-deep furrow about 18 in. wide will completely invert the plants. Fallow for a month, then roll on and with the furrow, and double disk again with the furrow. Follow this with a further fallow and continue disking in dry weather, working down to a good fine seed-bed for about 4 in. The land should be ready for sowing to permanent grass by the end of February, and no opportunity should be allowed for the buried sedge-plants to shoot through to the surface.

Fig. 2.—Showing how the growth reappears after indifferent ploughing and cultivation.

Fig. 1.—Toe-toe rush which has established after the initial clearing of the scrub.

A final stroke of the harrows and a rolling about the end of February or early March should give a fine, moist, warm seed-bed. Certified perennial ryegrass, cocksfoot, and white clover should give a sward dense enough to keep the sedge in check, and odd sedge-plants can be dealt with by chipping. It might be argued that the land is out of use too long and that crops are required. The crops, however, are usually poor, and a good pasture adequately prepared for will produce more feed in the following twelve months than the series of crops commonly grown. Further, the one swamp ploughing necessary can be done by a contractor and the ordinary farm implements used for the remainder of the work. The land is out of use during the summer only, when there is plenty of feed.

—R. P. Hill, Hastings.

Section for Irrigation Areas.

Contributed by Officers of the Fields Division.

Lucerne Under Irrigation.

Necessity for Ample Supply of Hay.

UNDER to-day's system of intensive farming the production of hay for winter and emergency feed is one of the most important considerations of the farmer. It is a well-known fact, and observation confirms it, that the more intensive the farming the greater must be the attention paid to the conservation of hay. On irrigated farms the provision of an ample supply of winter feed becomes an economical necessity, since through irrigation the summer and autumn months have ceased to be the limiting periods. If, therefore, the full carrying-capacity is to be maintained throughout the year, provision for the winter months is essential. In this direction lucerne hay is the cheapest form in which this necessary winter feed can be produced. Lucerne under correct irrigation will produce more economically a greater quantity of nutritious dry feed over a period of years than any other crop, so that on all irrigated areas a field of lucerne is essential.

Fig. 2.—Bordered lucerne at Levels six weeks after sowing 15 lb. of seed to the acre. Note direction of drilling.

While the usual principles of cultivation, manuring, liming, type of seed, and inoculation apply to the sowing of lucerne intended to be irrigated, there are several features which must be attended to and which need explanation in order to give farmers confidence in the ultimate result, which is a productive, clean stand.

Fig. 1.—Irrigated lucerne at Redcliff.

Border Method the most suitable.

In the main the border method is that most suitable for the working of the crop. This method allows of even irrigation and consequent even maturity, so essential if quality is to be maintained. Cutting presents no difficulties, as there are no ditches in the field beyond the necessary head ditches, and the necessary maintenance of cultivation and top-dressing can be carried out without bother.

Lucerne will thrive on practically all our irrigated soils, so that the selection of an area depends on its situation in relation to the rest of the farm and the ease and consequent less expense of bordering. The question of the situation is worth considerable thought, as it must be realized that a great deal of the handling and transport of the hay can be saved by having an area handy to as many fields as possible, for carting out.

Cultivation and Seeding after Bordering.

Bordering is carried out after the land has been brought to a clean and workable state, preferably by a period of fallow, during which intermediate ploughing, harrowing, and grubbing has taken place. This bordering leaves the levees in a high unconsolidated state and the borders in a glazed, hard condition.

The levees should be worked down by running the grubber or hustler up and down them, followed by a harrowing and double rolling in the same direction. This should leave them in such a state that will ultimately bring them to the suitable height of from 8 in. to 10 in. at the centre with a width of 4 ft. to 6 ft. After this working, the levees will still seem high, but it must be remembered that still further natural consolidation will take place. The borders should then be grubbed or hustled twice in the same direction as the fall of land—*i.e.*, parallel to the levees. After this, all the working should be done at right angles to the levees—*i.e.*, across the borders. Two alternate harrowings and rollings, finishing with a double rolling, will usually bring the area into suitable condition. At least 1 ton per acre of lime should then be applied.

To obtain the best results seed should be sown at the rate of 13 lb. to 16 lb. per acre through every coulter of the drill and as shallow as possible.

In order that the depth of drilling on the levees will be as near as possible to that on the borders, drilling must be done across the borders at right angles to the levees. If there is any doubt as to the consolidation of the levees, it is wise to broadcast an extra quantity of seed along them. The whole area should then be harrowed.

In drilling with the ordinary grain-drill it is almost always necessary to mix the inoculated seed with the advocated mixture of lime and super, as few drills can sow over 10 lb. of lucerne-seed in one operation through the seed-box. The practice of drilling half the quantity either way is not to be recommended, as the first drilling generally is buried too deep. The usual practice is to sow the mixture of equal quantities of lime and super at 2 cwt. per acre. The drill should be adjusted to sow somewhere around this mark, and a measured quantity of the mixture, say, 50 lb., without seed is then put in the drill and with the acre clock set at zero the manure is drilled out and a note made of the acreage drilled. The requisite quantity of seed per acre can then be calculated to mix with the manure sowing. This saves adjustment of the drill and allows of a reasonably accurate seeding without much trouble.

Fig. 3.—Close-up of Fig. 2.

Time of Sowing and Pre-irrigation.

On irrigated lands the time of sowing is from October until February. Where spring weeds, such as fat-hen, are troublesome it is better to wait until after Christmas. Late summer sowing has generally been found to give more satisfactory results. Should dry conditions prevail at sowing-time, the area may profitably be pre-irrigated a few days prior to sowing—this ensures a quick even strike and consequent strong growth.

The danger of scouring the soil or moving the lime on reasonably prepared borders is negligible. In autumn sowing consideration must be given to early frosts, as unless the young plants are well established there is danger of damage. A period of six to eight weeks should be allowed for before heavy frosts are anticipated.

Treatment the First Year.

Little can be expected from the stand until the following summer. Under good conditions the seedlings will be through the ground in from five to nine days, the initial growth for a fortnight onwards being rapid. From then on, however, little top growth takes place, and during this time weed growth is very noticeable, and as a consequence for the first two months in early sown crops and throughout the winter in late sown crops the stands generally present a discouraging appearance. If, however, the initial " strike " has been good, little notice need be taken of this. When the lucerne has reached 8 in. in height in early sown crops and has become bad with weeds the stand may be cut and the growth removed. In similar late sown crops the stand may be cut early in September–October. After this the area should be harrowed with heavy tripod harrows or lightly grubbed.

Irrigating the Stand.

Under normal conditions there is generally no need to irrigate for the first cutting, there being sufficient moisture to carry this cut through. A week after the cut has been removed the stand should be irrigated. Under Canterbury conditions, the amount of water applied will

Fig. 4.—Part of 36-acre field of irrigated lucerne at Redcliff.

vary with the rainfall previously experienced. It may not even be necessary to irrigate for the second cutting. However, it must be borne in mind that lucerne can profitably use up to 60 in. of water (inclusive of rainfall), and the irrigator should make his estimate on this basis. From 4 in. to 6 in. should be applied at each application. Excessive amounts of water are detrimental to lucerne, and, while it responds rapidly to water, it also quickly deteriorates under an excess.

Under Canterbury conditions three or four irrigations should normally suffice, while under Central Otago conditions six to eight applications may be necessary. A good stand will produce from 4½ tons to 5½ tons annually under such treatment.

Fig. 6.—An ample supply of winter feed—2,000 bales of lucerne hay in the Redcliff irrigation area.

Time of Cutting.

The stage of cutting determines the quality of the hay produced. The ideal lucerne hay is leafy and mellow, with an absence of woody stems. To ensure this, it is important that the crop should be cut at the proper stage, as immediately this is passed the quality of the hay made rapidly deteriorates, and dry woody stems with an absence of leaf is the result.

It has been found that the best stage for cutting is when the second growth, which commences at the crown of the plant, is about 1 in. long. It is, however, better to cut too early than too late, for the reasons mentioned above, and on an established stand no harm will result from early cutting.

Baling direct from the field is becoming increasingly popular, on account of the ease of feeding out, but there is no doubt that with this practice it is impossible to make hay of as good quality as when stacking is carried out.

Fig. 5.—Lucerne stacked and growing. Note irrigation ditch on right.

Treatment of the Stand.

Under irrigation, the stand tends to become more rapidly infested with grasses such as rye-grass, fog, and poa pratensis than it does where no irrigation is carried out. It is necessary, therefore, to resort to harrowing, grubbing, and top-dressing more frequently in order to keep the stand clean and to keep the lucerne plants in a vigorous growing condition. The yearly addition of 10 cwt. of lime and two top-dressings of 1½ cwt. of superphosphate, one in July–August and the other in December, will maintain the stand in the necessary condition.

—W. C. Stafford, Timaru.

Sweetbrier in Canterbury District.

Satisfactory results are being obtained in Canterbury in the control of sweetbrier by the application of sodium chlorate.

Because of the absence of any specific weedicide for dealing with brier in the past, eradication was difficult, and during the depression and due to financial difficulties little or no work was carried out on much of this country. Experiments in this district with sodium chlorate during the past few years have, however, shown that when the crystals are applied to the roots of the plant highly satisfactory results have been obtained. The method adopted is to apply the sodium crystals to the base of the plant, more particularly during the period March–June, and good results have also been obtained in August.

With this knowledge, steps were taken by the Departments' officers to bring under the notice of landowners the results from the use of sodium chlorate, and to secure their co-operation in an endeavour to control the spread of the weed. It is recognized that it is beyond the financial means of some to attempt more than this, especially on properties which are heavily infested. It was considered, however, that a definite attempt should be made to check the spread of the weed, and landowners were requested to do this by first dealing with scattered plants and small clumps and by doing a certain amount each year to gradually gain control.

The heavier affected areas could then be considered. The County Councils in Canterbury have been approached and asked to assist by stocking sodium chlorate or Atlacide, so that it could be supplied to ratepayers at cost-price. Almost without exception, they have responded to this request. Many landowners are taking advantage of this plan.

There are a number of places where it is beyond the means of the individual to deal effectively with the pest.

—W. D. Blair, District Superintendent, Live-stock Division, Canterbury.

Horticultural Instruction.

Contributed by Officers of the Horticultural Division.

The Orchard.

FROM now on until the end of the fruit season harvesting and storing of fruit will be the chief work of the orchardist, some growers will be using ordinary shed storage at the orchard owing to excess of work during export, others putting their fruit into cool storage for marketing during the months of September, October, and November. Whether the fruit is intended for ordinary storage in sheds or cool storage, every care should be taken with the growing and packing to ensure that storage rots will be reduced to a minimum. There is no doubt that too much fruit, stored for future marketing, is lost every year by growers through carelessness and inattention to details. It should be remembered that damaged fruit, from any cause, placed in store will not come out of storage in perfect condition. One or two faulty fruits in the case will depreciate the value of the whole. Stem-punctures should be carefully avoided, especially in such a season as this, when rots are developing so readily. It very rarely pays to store low-grade fruit, the prices realized for such fruit ex cool store often being lower than the storage and marketing costs. Where fruit is held in ordinary shed storage it should be stacked so that a current of cool air can pass through the cases to prevent the rapid maturing of the fruit. Although the practice of some growers to wrap the fruit before placing in cool store is quite good, providing only perfect fruit is packed, it is much more preferable to place the fruit in cool store unwrapped, and do the necessary wrapping and packing to conform with the New-Zealand-grown Fruit Regulations 1938 when the fruit is taken out of store.

The placing of wrapped fruit in store if repacking should be necessary means much extra expense. Growers who have mid-season varieties of fruit stored in their sheds should examine them frequently, and at the first sign of wilt or rot they should be placed on the market. Although the later varieties will, as a general rule, keep much longer either in ordinary shed or cool storage, it is advisable to examine the fruit at intervals, and any line showing signs of maturity should be forwarded to market at once.

Late Spraying.

With the close of the harvesting-period attention should be given to spraying, especially stone-fruits. Results obtained during the past few years clearly indicate that a "leaf-fall" spray of Bordeaux mixture at strength 5–4–50 helps very materially in controlling leaf-curl, die-back, and brown-rot. This spray, followed by another of the same strength at "bud-movement" in the early spring has proved most effective, and growers of stone-fruits are strongly advised to adopt this programme. Very little attention is paid to pip-fruits with regard to spraying during the autumn, the majority of growers preferring the early spring or "green-tip" spray. As a good clean-up spray for pip-fruits the application of Bordeaux mixture, same strength as for stone-fruits, will be found beneficial in the destruction of spores, and will be of great assistance in the prevention of disease for the coming season. The late autumn is also a good time to destroy, by burning, all mummified fruits left on the trees, and badly cankered and diseased infected branches, these being the parts where disease is carried over during the winter to start fresh infections during the following spring.

Drainage.

The autumn season is the best time for the orchardist to attend to the drainage system of the orchard. It is well known that fruit-trees will not tolerate "wet feet." Effects of insufficient or inadequate drainage is easily seen in the growth and unhealthy appearance of the trees. All existing open drains should be thoroughly cleaned out, and deepened where necessary, to enable any surplus water during the winter season to be carried away freely. It may be necessary to provide further drainage in the orchard, either by connecting up with existing drains or cutting new ones. If so, care should be taken to see that they are of sufficient depth and fall to ensure good working. Scrub and rubble drains are quite good and, if correctly done, are effective, but tile drains, although more expensive in the first place, will be found more permanent, convenient, and usually give greater satisfaction.

Ploughing and Manuring.

Where cover-crops are not being grown it is advisable to plough the orchard during the autumn, before the soil becomes too wet to work properly. With autumn ploughing the soil is exposed to the effects of frosts and rain during the winter months, this being of great assistance when breaking-down during the spring. Although it is advisable to plough as deeply as possible at this time of the year, care should be taken not to injure any of the main roots of the trees; consequently it is preferable to make the deepest cuts in the centre of the rows of trees, gradually getting less towards the trees. By ploughing up to the trees, with the fall of the land, leaving an open furrow down the centre of the rows, surface drainage will be greatly facilitated. In cases where cover-crops have been sown, ploughing will have to be deferred until such time as the crop is full grown, but no time should be lost when this

stage is reached. The early turning-under of a cover-crop enables the green matter to thoroughly decay during the winter, and helps to reduce the soil to that condition necessary to create a good tilth during the spring.

The usual orchard practice is to manure during the spring, but if potassic manures are being applied it would be well to consider the autumn application of such manures. These manures are slower in action than nitrogenous manures, and if applied just before ploughing in in the autumn they will be available to the trees in the spring. The application of nitrogenous manures may well be left until the spring. The application of 1 ton per acre of carbonate of lime, where necessary, is best done during the autumn and just before ploughing.

—*George Stratford, Orchard Instructor, Motueka*

Citrus Culture.

THE principal work in citrus orchards during the next few months will consist of harvesting the fruit as it reaches a maturity suitable for picking. Picking of lemons should be made every three to four weeks in order to maintain a uniformity of size and good condition of the fruit. The demand for oversized, coarse, or tree-ripened fruit does not warrant its production, and such fruit can be avoided by harvesting at close, regular intervals. Lemons should be picked when they reach approximately the size that pack 150 to 200 to the bushel case, irrespective of whether their colour is green, silver, or yellow, as these sizes are the most popular with the retailer and the consumer. Furthermore, tree-ripened lemons have but a short life and are extremely susceptible to storage rots during the interval between picking and reaching the consumer.

Careful handling during all operations from the picking of the fruit until it is sold is essential to prevent injury to the skins. The fruit should be cut from the trees with sharp clippers with rounded nose. The first cut is made about 1½ in. from the fruit, and a second cut made to trim the stalk level with the button. It is necessary for the pickers, graders, and packers to wear gloves to prevent scratching of the ski with their finger-nails. If this precaution is not taken, the finger-nails should be kept trimmed as short as possible.

Brown-rot.

Brown-rot(*Pythiacystis citrophthora*) can cause extensive damage by rotting the fruit and by defoliating the tree. It is troublesome only during the winter and early spring months. Infection is usually spread from the ground to the lower branches by rain splashes, and in wet weather will spread rapidly throughout the tree. Control is readily obtained by removing all branches within 1 ft. 6 in. of the ground, and spraying the tree thoroughly with Bordeaux mixture 3–4–50. In most citrus areas the disease does not become troublesome before early in June; consequently the first preventative spray should be applied during the last week in May. Orchards known to be subject to infection earlier in the season should have the spraying date advanced accordingly. A second application late in June or early in July is necessary in some localities, especially in wet seasons. One per cent. of summer-oil can be added to this spray where scale insects are troublesome. While the oil serves as a valuable insecticide it should be used in combination with Bordeaux mixture only when absolutely necessary on account of the difficulty which will be experienced in removing the spray residue from the fruit.

Marketing Regulations.

Attention is drawn to the provisions of the New-Zealand-grown Fruit Regulations 1938, which were gazetted on the 24th March, 1938. The provisions of these regulations make it compulsory for all lemons sold, other than to a factory for processing purposes, to be graded according to the specified grades. Growers who are handling small quantities of this fruit or who do not possess adequately equipped packing-sheds will probably experience difficulty in grading and packing to the prescribed standards. It would be advisable for them to obtain advice as to grading from the local Orchard Instructor or they may prefer to send the entire crop to a central packing and curing shed, where it will be cured, graded, packed, and marketed by trained operators.

Protecting Young Trees.

In young orchards where frost-preventative methods are not employed valuable protection against frost injury can be afforded by placing brush-wood around each tree. This practice will, at the same time, protect the trees from the harmful effects of cold wind, and is more effective in every way than scrim shelters.

—*Percy Everett, Orchard Instructor, Gisborne.*

FUNGUS GROWTH ON GRASS.

C. O. S. (Wairoa) :—

I shall be glad if you can enlighten me regarding the following in the *Journal of Agriculture*.

I have noticed a disease on grass, starting as a black fungus-like growth on the blade, then going grey and eventually yellow. I should like to know the cause of this.

Fields Division :—

The black and grey patches noticed on grass and clovers this season is due to a fungus *Badhamia calvescens*. This is a common soil organism which produces large masses of spores on a number of grasses during warm, humid conditions. It does not actually attack the leaves, but sometimes has a smothering effect. The organism does not thrive in dry conditions, and disappears rapidly in dry or cold weather. Where it is actually present long enough to smother the grass, close mowing of the patches or heavy grazing will clean it up. There is no record of this fungus being injurious to stock. The fungus is fairly prevalent on the East Coast this season.

Vegetables, Small Fruits, and Flowers.

Contributed by the Horticultural Division.

The Past Season.

COMPARATIVELY high temperatures, rather long periods of dry weather, alternating with periods of heavy rainfall, have been the experiences in many parts of the country during the past cropping season. The reaction of crops and methods of cultivation to these conditions has often been interesting. High temperatures with abundant rain stimulated growth, and, where generous initial applications of soluble artificial fertilizers were made, it was sometimes excessive. In the case of fruiting crops, such as tomatoes, a serious loss was often the result. This was due to the weather conditions increasing the availability of the plant-foods and together forcing a rank growth that was unfruitful. Where such was the case the experience indicates the desirability of moderating the quantity of the initial application of fertilizers of this class and making further applications during the growth of the crop, as may be found necessary.

Plant Diseases experienced.

Among plant-diseases in evidence there is to be recorded the presence of bacterial-canker of tomatoes (*Aplanobacter michiganense*), also reported as prevalent this season in Australia. As with some other bacterial troubles, identification merely by symptoms is not very reliable, owing to their similarity to those caused by other organisms or conditions. Shrivelling foliage, splitting stems, and the development of cavities in the stems are among the more prominent symptoms, while on the fruit the "bird's-eye" spot-stage of the canker is sometimes found. These are snowy white and raised above the surface, later cracking open they become rough and brown in appearance. The occurrence is being investigated by officers of the Plant Diseases Division, whose report containing data collected under local conditions will be of the greatest value to those who grow this crop. It is important to note this trouble is seed-borne and may be found in and on seed taken even from fruit that is to all appearance free from the disease; also usually it is not until the seedling plants have been planted out in their permanent quarters for some time that the symptoms appear. The tomato-plant, it seems, is the only host for this organism, but all commercial varieties are susceptible. The chief danger of attack at present lies in sowing infected seed.

Another occurrence which, while not new, is fortunately unusual is black-rot disease of cabbage. This also is due to a bacterium, *Bacterium campestre*, which attacks all cruciferous plants, including weeds. Infection may take place at any stage of growth—yellowing leaves followed by blackening of the veins are the early symptoms. A cross-section of the stem shows the woody tissue brown or blackened. There is no remedy for the disease, but its spread may be stopped by pulling and carefully destroying all infected plants immediately, thus preventing as far as possible the distribution of the disease by means of stock or implements, or the soil becoming seriously infected. A long rotation and clean seeds should then prevent a recurrence of the trouble.

Losses in Crops.

Towards the end of the season there were many complaints regarding losses, in vegetable crops chiefly, due to the attack of caterpillar larvæ. The chief offender was the yellow and green larvæ of a native moth known as *Plusia chalcites*; but much harm was also done by what has been called the kowhai caterpillar of speckled black and yellow colour, *Mecyna maoralis*. The former has for some time been a serious pest of tomato and bean crops, but this season silver beet and parsnip foliage were included amongst the number of crops attacked. These losses may be prevented by applying a solution of arsenate of lead as soon as the danger is noted, or, in the case of salad and cabbage crops, a light dusting of derris powder. Periods of fine, dry weather during the summer facilitate the spread of these pests, and it is then that special vigilance is necessary.

The Seed Order.

In the successful production of seedling crops it is self-evident that there is nothing more important in the attainment of that object than the fact that the seeds should be good—that is, they should be free from disease, of strong vitality, true to name, and of a superior strain. Important as it is, the quality of seeds is often taken for granted, and so long as the price is moderate they are bought with very little further consideration and stored in a cabinet, or placed on shelves, in a damp potting-shed or similar place until used. Such an important factor in cropping demands careful consideration, and the present time is most suitable for the purchase of the seed requirements of the coming season.

Disappointing experiences, which unfortunately have been of common occurrence, have impressed the fact that some of the most serious diseases affecting plants are borne on, or in, the seeds. It is a fact to be specially remembered when buying overseas and dealing with an unknown supplier whose special attraction is cheap seeds. By cutting down the work of selection and roguing and disregarding the presence of disease cheap seeds may be grown, but the crop from them will not be outstanding for size or quality; generally it will be useless, and occasionally it will be found that a disease has been introduced which will be costly to eradicate. In no purchase is it so necessary that one should deal with a supplier of good repute. With other goods the quality and workmanship can often be ascertained on examination before purchase, but seeds must to a

great extent be bought on the reputation of the supplier. It is true that the purity and vitality of seeds can be ascertained, but that they are true to name, of good strain, and free from disease has to be taken on trust. There are men and localities with a special reputation for the production of certain seeds, and it is best as far as possible to deal with them and pay a price which is necessarily comparatively high. With the more important crops it is often advisable to grow a few plants to test the strain before sowing the bulk and planting out large areas.

Selection of Novelties.

The progressive grower is naturally attracted by the list of "novelties" found in the seed catalogues, but if he is also experienced he will make a selection of those likely to suit his land, climate, and trade and give them a trial before discarding standard varieties in their favour.

What has been said here applies also to potato "seed." The grower now is able to obtain seed of this kind which is reliably "certified" to be true to name, free from disease, and a good yielding strain. One is very unwise to plant any other, and as the supply of good stocks is not inexhaustible an early purchase of the season's requirements should be made and given proper storage so that it may be in the best order when planted and be on hand at the moment when all conditions are favourable for sowing. Suitable storage for seed potatoes is a place which is cool, normally humid, and well ventilated to check heating and sprouting. A few weeks before planting it is an advantage to increase the temperature and light to encourage the production of short, sturdy sprouts which will give the crop a good start, and is of special importance with the early varieties. The storage of seeds of other kinds requires equal care, especially in humid localities, and more especially again where the temperatures are high. A damp shed anywhere is unsuitable for the storage of these seeds which, to maintain a high percentage of germination for a maximum period, must be given *dry* storage conditions. Parcels of seeds on arrival should be checked over, labelled and dated, and given perfectly dry conditions, which is all the more important in humid localities.

Planting Trees and Shrubs.

Another "planting season" commences with the month of May, and well-thought-out plans may then be carried to a successful conclusion if good plants are set out in well-prepared ground or that which is naturally suitable. Like any other business man, a nurseryman is careful to avoid loss by carrying surplus stock, and as the quantities propagated have usually to take the chances of weather and other vicissitudes during a period of at least twelve months' growth before the plants are ready for sale the risks are greater than with factory-made articles. The discriminating buyer, therefore, who wishes to avoid substitutes is wise to inspect the nursery crops now if he has not already done so, make his selection, and place his order for delivery as soon as the plants are ready. As the planting-season passes the selection, in both kind and quality, usually narrows down, and in some instances very rapidly. At this stage the plants can be just as well accommodated on the farm as in the nursery, and they are then on hand for planting at any moment when circumstances enable it to be done best and most conveniently. It is to be remembered that they are living plants and want attention, but if they are carefully "heeled in" in a piece of friable land conveniently situated very little further attention will be required until it comes to planting. It is well known that the roots of plants must not be exposed to sunlight and wind, or be allowed to dry out, but where large quantities are being handled special supervision is necessary to see these elementary but important rules are observed under all circumstances. Where the preparation of the land has been completed satisfactorily early planting should be done whenever possible as, although little top-growth will be made, root activity is very considerable during the winter months. An exception can possibly be made in the case of plants which may be injured by low temperatures. These are often reserved for planting in the spring when serious low temperatures are unlikely to occur.

Hedge and Shelter-trees.

From early times these latitudes have been known as the "roaring forties." Escaping the sudden hurricanes of the tropics they frequently experience long spells of boisterous weather which are injurious to tender crops, heavily laden trees, ripening grain, and, specially when temperatures are low, stock and pastures. For this reason hedge and shelter planting is of special importance here, although it is commonly overlooked, probably because it makes no direct return. Where fruit-growing and intensive cropping are done it is of the highest importance, as also is it about the homestead. Some of the mistakes of the past have been lack of proportion, the shelter has been too high and large, too close to buildings, too inflammable, excluding light and air, or requiring a great amount of labour trimming and topping it to keep it in condition. In most districts these mistakes have been made and should warn one from making a repetition. It must always be remembered that the most valuable information on this subject is contained in the success and failures of previous planters in one's own locality on similar land. If the ultimate height of the plant and the quality of the land are considered there is a sufficient variety of plants available to meet all requirements without making any of the serious mistakes above mentioned. The main necessary features usually are a dense belt, principally evergreen, to break the force of the prevailing wind, and hedges to leeward, fairly closely planted, but limited so much as possible to avoid the labour of the annual trimming which must be done. On broken country "spot" planting is done after clearing inflammable material present. On flat country no preparation is too good for the quick establishment of so important an asset. A rule to be strictly observed afterwards for at least a few years until the plants are well established is to see that the competition of weeds and grass does not seriously rob the plants of the light and air required for rapid growth.

Small and Sundry Fruits.

Small fruits for planting at this season are currants—black, red, and white—gooseberries and raspberries, all of which demand a cool climate for the best results. Loganberries, Cape gooseberries, tree tomatoes, and passion fruit thrive in the warmer districts, but they are all best planted in the spring.

Sundry fruits include the nuts—almonds and walnuts—which thrive best in the drier eastern districts; and chestnuts and hazel, which are less particular in that respect. Persimmons, figs, and mulberry are deciduous trees of moderate size which thrive well in localities that are fair to warm. Feijoa and loquat are evergreens requiring a similar climate. Chinese gooseberry is a vigorous deciduous vine requiring a fairly warm position and good soil. It is uncommon among our fruit plants in that each is of one sex only, the fruit being borne on the female plant alone.

All of these plants are worthy of consideration for planting in suitable districts, both for home supplies or market purposes. The small fruits mentioned above for planting now require a good rich, moist loam well prepared and quite free from twitch and bad weeds; red currants and gooseberries will also thrive on a somewhat lighter soil. All should be planted in solid brakes where injurious root disturbance can be avoided. The sundry fruit plants mentioned are generally, and

usually, best planted about the homestead or paddocks, where they often serve a double purpose of use or ornament as well as carry a crop of fruit or nuts. Walnut and chestnut make useful shade, shelter, or avenue trees, as well as producing good timber, while the Chinese gooseberry is an excellent vine for affording summer shade on pergola, loggia, or trellis. The remainder have distinctly ornamental features which enable them to be planted in any position where the land is suitable, in the form of specimen trees or groves. Those who contemplate much planting under this heading should consult the Government Orchard Instructor for the district. He has opportunities for knowing the locality and its suitability for any of these crops, and will be pleased to advise in the case of difficulty or doubt. The local office of the Department of Agriculture will tell you where to find him.

Ornamental Trees and Shrubs.

The influence of the home is a topic which receives much attention, but it is rarely realized that the influence for good will be increased if it is made pleasant, interesting, and attractive by suitable planting in the vicinity. This may be done by affording shelter, shade, and flowers which blossom in succession. It is true this often makes a great deal of work, but it will not do so if the plants selected are suited to their environment—they will then flourish with little attention and, if rightly placed, will not outgrow their position. There are attractive trees and shrubs suited to practically all of the soils and situations here, whether they be shady or sunny, wet or dry, sheltered or exposed, whether the soil be light or heavy. If a garden has been planted not too wisely one is not committed indefinitely to endure the conditions; in fact, a few removals, possibly transplanting some of the shrubs, and a few additions will often enable one to rectify most of the mistakes which have been made. Even when the planting has been skilfully done there are "fillers" which have to be removed and replaced with subjects which could only be planted when good shelter and shade had become established, as, for instance, the tree ferns, nikau palms, hydrangeas, rhododendrons, &c. After studying the subject during the past growing season one should now be in a position to advance the improvement of the garden another stage by making some of these alterations and additions during the planting season. When setting new plants make sure they are free from diseases, pests, and bad weeds; shorten straggling roots and cut clean away those which are bruised and broken. Thin out the branches of shrubs if they are inclined to crowd and cross, using sharp shears and cutting close so that the operation has not to be repeated. Examine trees carefully and remove a double leader or branch which is likely to upset the balance. Then plant out when the ground is sufficiently dry to be thoroughly consolidated about the roots without clodding, setting the plant at the same depth as it grew previously. To secure vigorous growth the branches of shrubs of most kinds should then be shortened back to just beyond a bud pointing outwards, and the leader of a tree to a bud pointing in the direction of the prevailing wind.

—Wm. C. Hyde, Horticulturist, Wellington.

DEPARTMENT OF AGRICULTURE.

WALLACEVILLE POULTRY STATION.

FOR SALE—

WHITE LEGHORN

AND

BLACK LANGSHANS.

Orders being booked for Breeding Stock.

For full particulars apply—
THE POULTRY OVERSEER,
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Private Bag to Wallaceville,
WELLINGTON.

Work for the Month in the Apiary.

Management of Supers and Winter Stores.

THE removal of the supers should go on steadily, as the bees form their winter clusters. In the case of very strong colonies it will often be found difficult, if not impossible, to confine the bees to one story without seriously diminishing winter stores and unduly crowding the bees. In these cases it is best to leave the super on until the spring.

The best place for winter stores is in the hive, and however careful the beekeeper may be in replenishing these, if the honey is removed from the hives and is not within reach of the bees at all times during the cold weather there is still the risk of allowing them to starve out. There are very few districts in New Zealand where brood-rearing absolutely ceases during the winter, especially when the hives are well sheltered, and the bees require food at all times and seasons. On no account, however, should they be allowed to winter in more than two stories. In many cases they will be showing a tendency just now to go as high as they can get in the hives, and where this happens it will usually be found that the combs in the bottom story are deserted and dry. A rapid examination will soon show the beekeeper whether this state of affairs obtains, and, if so, he should remove the bottom story, leaving the cluster undisturbed.

Where queen-excluders have been left on the hives they should now be removed, because it sometimes happens that the bees will go through the excluders to the stores above, leaving the queen to perish below. There is always a tendency for the cluster to move to the warmer part of the hive, and an excluder will not act as a bar if the bees are dissatisfied with the lower story.

Mats for Wintering.

To ensure that the bees are kept warm through the cold weather it is absolutely necessary that the frames should be well covered with good mats. Three or four are by no means too many to provide for each hive. Ordinary corn-sacks cut into pieces the size of a zinc queen-excluder answer the purpose admirably, and are very durable. Avoid using calico mats, as these are next to useless for wintering purposes. It is essential that the mats should fit exactly over the frames; if too small they admit draughts, and if too large the edges will protrude beyond the hive-covers, and in wet weather these will absorb sufficient water to cause the mats to become damp and unhealthy and the combs mouldy.

Clearing Weeds.

Weeds should be kept down. A good clearing of the weeds round the hives in the autumn will suffice until the spring, and will add materially to the comfort of the bees and the well-being of the hives during the winter months. Not only should the entrances be cleared, but the ground all round the hives should be similarly treated, and the weeds raked up and destroyed.

Care of Utensils.

Utensils that have been in use during the extracting season should be thoroughly cleansed prior to storing away for winter. Remove all traces of honey from the extractor, tanks, uncapping-knives, &c., washing with boiling water, and drying thoroughly to prevent rusting. All metal parts liable to rust should receive a coating of oil. The cost of renewing working-equipment is becoming a serious burden on the profits of the apiary. By a little judicious care and management the life of a beekeeper's working-equipment can be prolonged; much of the expense incurred in replacing damaged utensils is usually the result of sheer neglect. Loose washing covers should be made to cover the extractor and tanks in order to prevent these utensils getting coated with dust, which is likely to accumulate during the off season.

Care of Hives.

At no other period is the welfare of the hives of such importance as during the next few months. Every hive should be raised from the ground the height of one brick, and if the situation is damp or low-lying it is a good plan to raise the hives still more. This will tend to keep them free from slaters (wood-lice) and other insects, and will afford less harbour for mice, as well as ensuring that the hives have a free current of air beneath the bottom-boards, and thus are more likely to keep dry. Never rest the bottom-boards on the ground, or they will rot in a very short time and become mouldy and evil-smelling.

Before bad weather sets in it is a good plan to give a coat of paint wherever it is needed, at the same time stopping up all cracks in the supers. Cracks afford ventilation during the summer months, but they are hardly to be advocated on that account, because the beekeeper will usually find that towards the end of the honey-flow the bees will use up much valuable time in gathering propolis to fill up the cracks in view of the approach of winter. The hives should be slightly canted forward, so that any rain which falls on them will drain off the alighting-board.

Leaky Hive-covers.

Apart from disease, there is no worse feature in an apiary than the presence of leaky roofs. A cover which allows moisture to trickle through is a constant menace to the colony it appears to shelter. Not only will the mats immediately beneath it become sodden and mouldy, but the cluster of bees in the hive stands in danger of extermination when frosts set in. There will then be pollution on the bottom-board, where the intruding moisture mixing with dead bees and waste pollen forms a rotten fermenting mass, with a stench which the order-loving bees must find even more obnoxious than does their owner.

There is no excuse for leaky covers. In the autumn the apiarist should examine them for any doubtful spots, and, where necessary, should cover them with zinc, rubberoid, or some other waterproof material. Or, if economy must be practised, he should cover with cheese-cloth, applying to the roof first a coat of paint, then the cheese-cloth, and then another coat of paint. This makes an effective waterproofing, and which anybody can apply.

—E. A. Earp, Senior Apiary Instructor.

Marketing of Honey.

F. R. Picot, Director of Internal Marketing.

HONEY producers will have noticed the statement made by the Hon. Walter Nash, Minister of Marketing, that in response to an overwhelming advocacy on the part of honey-producers generally the local marketing of their produce is being undertaken by the Internal Marketing Division.

Negotiations have proceeded with the Directors of New Zealand Honey, Ltd., with the result that the Department has absorbed their equipment, plant, and stocks. Mr. Rentoul, previously in charge of New Zealand Honey, Ltd., and also associated with the Honey Control Board, is being retained by the Department, and will, as before, be in close contact with the industry.

Because of the very low quotations which are being made in some instances by producers themselves for their honey it becomes immediately necessary to advise the producers that the Department is prepared to offer a *pro rata advance of 4½d. per pound according to grade* for all honey delivered to the various grade stores and/or to the premises previously occupied by New Zealand Honey, Ltd., in Stanley Street, Auckland.

Although producers will be pleased to notice that the advance is being made on such a liberal basis, it is to be carefully noted that a final payment up to the full value that the honey will produce will be credited to suppliers.

On page 298 is a list of grading dates for the various stores, and it is sincerely hoped that producers will take the opportunity of forwarding their supplies to these depots promptly. Advances will then be made as soon as possible after the grading of the honey.

It is felt that as a result of the Department pooling the export and the local market returns substantial benefits should accrue to the industry, and I take this opportunity of asking for the full co-operation of producers by sending their maximum production to the Department. In this connection producers throughout New Zealand have advocated a method that would give them the maximum amount of security, and it will be readily seen that the method now to be employed by the Government must ultimately lead to the advantage of the industry as a whole.

In conclusion, I wish to assure the producers of honey that no effort will be spared to serve their interests in the best possible way. At all times we will be pleased to answer any inquiries on matters relating to our activities, and we assure you that it is our desire to work an organization of which your industry will be proud.

Packing, Branding, and Consigning Honey.

ALL honey is to be packed in 2 x 60 lb. tins or 2 x 56 lb. tins to the case. The tins are to be strongly made and to have lever lids or screw-cap lids not more than 3 in. in diameter—2½ in. for preference. All honey sent in is to be granulated unless otherwise arranged. It is important that weights be correct—60 lb. tins should weigh 62½ lb. gross, and 56 lb. tins 58½ lb. gross. Underweights involve additional expense to the consignor for handling and reweighing.

Cases are to be branded one end only: "New Zealand Produce: Pure Honey. C. & E.M.—L." The producer's brand number must be put in the *lower right-hand corner*.

Producers who have a N.Z. Honey, Ltd., number are to continue to use that number as a brand. Those who have no number are to apply to the office, P.O. Box 1293, Auckland, and a brand number will be allotted to them. Stencil above the number the net weight. Put the extraction mark on the *top right-hand corner*. The extraction mark is a letter or figure put on the top right-hand corner to indicate that all the honey under the same mark is identical.

Suppliers will consign honey to whichever of the following stores is most convenient, advising *both* the Agent of the *particular store stated and the office, Box 1293, Auckland, of the quantity sent; date consigned; how forwarded (rail, boat, or motor); and whether or not freight paid*:—

Bluff.—Southland Cool Stores, and advise stores.

Dunedin.—Alliance Bee-supplies, and advise Alliance.

Timaru.—N.Z. Refrigerating Co., Ltd., *Smithfield*, and advise company.

Lyttelton.—Harbour Board Cool Stores, and advise Messrs. Claude Ferrier and Co., Lyttelton.

Greymouth.—Harbour Board Store, and advise Messrs. Nancarrow and Co., Greymouth.

Wellington.—The Colonial Carrying Company of New Zealand, and advise the company.

New Plymouth.—The New Plymouth Express Co., and advise the company.

Auckland.—Internal Marketing Division (Honey Section), Stanley Street, Auckland, C. 1.

Advice of consignment is to be sent to the Internal Marketing Division (Honey Section), P.O. Box 1293, Auckland, and to the Store Agent. All honey is to be consigned to the various stores at the times appointed for grading. On receipt of the Grade Certificates by the office, an advance of 4½d. *pro rata* according to grade will be paid to the producer. For the purpose of grading, points will be allotted by the Grader on a percentage basis for flavour, colour, grain, condition, and freedom from froth.

Pay-out points will be allotted for each quality, and shall be as follows until altered or amended:—

Quality.	Pay-out Points.
Flavour ..	.. 40
Colour	.. 25
Grain	.. 20
Condition ..	.. 10
Freedom from froth	.. 5
	100

The following classes of honey will be rejected: Honey-dew, flax, kie-kie honey, extra strong eucalyptus, extra strong ragwort, extra strong manuka, extra strong pennyroyal, extra strong heath.

If producers have no stencil for branding cases, the brands can be put on in the grade stores at a small charge.

Poultry-keeping Section.

Geese.

According to the census returns of poultry taken during 1936 there were 66,637 geese in New Zealand, an increase of 17,539 (39·97 per cent.) over the previous census, which was taken during 1926.

As geese are by nature grazing birds, they will, if given their freedom in suitable environment, pick up most of their living, and a small flock should if well managed return a reasonable profit as a side-line on quite a few farms in this country.

Environment.

In order to keep geese profitably they must have suitable surroundings so that they can feed economically, and as grass is their mainstay there should be plenty of this to provide free feeding. The herbage need not be of the best; in fact, they will keep fit on rough pasture that will not suit some other stock.

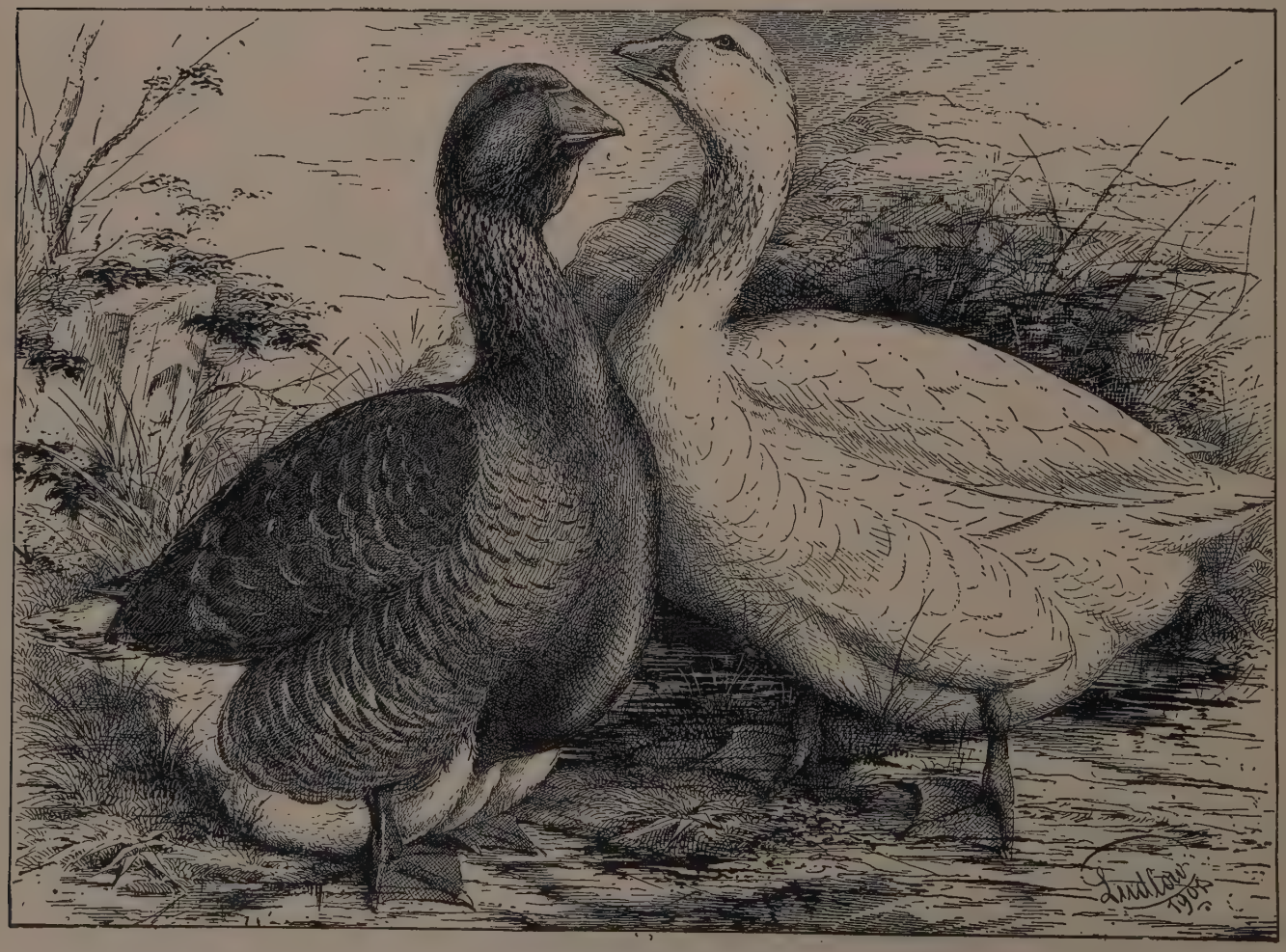
Where paddocks are broken up with creeks, and on more or less rough, unploughable ground containing some swamp, geese should do well, but they should be able to get dry ground to camp. They do well in an orchard, especially during the late season. In an orchard they find much inexpensive food, as well as helping to destroy insects.

As indicated, geese are practically self-supporting if given suitable environment, but they do not do well if kept in yards, and are not likely to show a profit if they have to be hand-fed too much. In most parts of New Zealand geese require no housing accommodation, but they should have shelter from very rough weather, and if enclosed at night the shed should be well ventilated and have a dry floor.

Breeds.

There are several varieties of geese, but the most popular in New Zealand are the Embden and Toulouse.

The Embden.—This is a pure-white bird with an orange bill and legs and light-blue eyes. Their carriage should be



Most popular types of geese in New Zealand—on the left, the Toulouse; on the right, the Embden.

rather erect, not unlike a very large Pekin duck, with no sign of the keel as shown by the Toulouse. They grow fast and fatten well.

The Toulouse geese are grey birds. The back and wings are dark steel-grey with a paler edging, and the breast a sound grey of a lighter shade. The stern, paunch, and tail are white. Both bill and legs are orange, and the eyes dark. In carriage and shape they more resemble the Rouen duck. The neck is shorter than the Embden's, and has a peculiar drooping mass of loose flesh under the lower mandible, called dewlap. As a rule the Toulouse is considered the better layer and not so much inclined to broodiness as the Embden, but they do not fatten quite so readily.

These two breeds are often crossed, and many geese seen on farms are cross-breds.

Breeding.

Select strong well-proportioned birds of medium size rather than extra large birds, but avoid those birds that are smaller than the average of the flock. As progeny produced from young parents seldom possess the desired constitutional vigour it is advisable to see that the females are two years old and the ganders at least one year old before they are bred from. However, the same geese should make good stock birds until about ten years old. It should be remembered that geese will not mate until they have become well acquainted. Very often if a fresh goose or gander is introduced into a flock at the beginning of a breeding-season it will not mate the first year. If fresh blood is required, it is advisable to introduce it about May, in order to give time for the birds to become well acquainted before the breeding-season. Generally speaking, from two to three females may be run with each gander.

Swimming-water.

To obtain the best results geese should be able to get to swimming-pools, especially during the breeding-season, as if they cannot get swimming, fertility is likely to be poor.

Period of Incubation.

Geese-eggs take from twenty-eight to thirty days to hatch. Some geese, like some fowls, will lay more eggs than others, but usually where it has to get all its own food a goose will lay ten or a dozen eggs and then become broody. Other geese will lay from thirty to forty eggs in a season, especially when they have been hand-fed.

If the first egg is marked and left in the nest, and the others removed as they are laid, a goose will often be induced to lay more eggs. However, once a goose begins to shed her feathers the eggs should be left in the nest, as this is a sign that the bird will soon become broody.

Incubation.

Natural incubation of geese-eggs will give the best results. Many geese make good sitters, and hatch out their eggs well. They will usually choose a secluded place for their nests, but if some straw is placed in boxes or barrels laid on their sides, in likely places near swimming-pools or in hedges the birds will often be induced to make their nests in such places.

Quite a few owners place the first few eggs under ordinary hens. A good-sized hen will cover four or five eggs, and a goose from ten to twelve, but care should be taken to see that the bird is able to cover all the eggs set. It is much wiser to set one egg less than one too many. When eggs are being held for incubation it is advisable to turn them each day, and if placed under hens it is also advisable to turn them owing to their weight.

In order to get the best results it is well to moisten the earth round the nest every few days, especially during dry weather and just before the hatch is due. This is not so necessary when the eggs are being hatched by geese that can have a swim when they come off the nest to feed.

Rearing.

After the first few days goslings are hardy little things, but it is usually better to keep them with their mother in a coop with a wire-netting run attached until they get strong on their legs. However, care should be taken to see that the coop is on dry ground and shaded from the hot sun.

Feeding.

After the goslings have been hatched twenty-four hours they may be fed on equal parts of bran and pollard, moistened with hot water or skim-milk. A little sand should be added to the mash. As much as they will clean up should be fed three times a day. As they develop, and by way of variation in diet, boiled wheat, barley, or potatoes and other vegetables may be added. However, as previously indicated, if geese are to be reared at a profit they must be induced to forage and gather most of their living.

Fattening.

Many geese are reared entirely on grass after about the first week, and are marketed when about three months old before they begin to moult their wing feathers. In order to get them in the best market condition it is advisable about three weeks before selling, to place them in small, clean yards, shaded from the sun and sheltered from bad weather. They should be given plenty of clean water to drink, but not to swim in. It is advisable to see that they are kept as quiet as possible, and given three good feeds per day. The morning mash can be made up of equal parts, by measure, of pollard, maize-meal, and bran, moistened to a crumbly mass with skim-milk. This mixture can also be fed at noon. The evening meal may consist of boiled vegetables, pollard, and boiled wheat. Grit should be within reach of the birds at all times.

When producers have gone to the trouble of placing geese on the market in the best condition they should endeavour to sell by the pound instead of by the pair, and no doubt if poulterers knew that they could get primed birds they would be prepared to deal in such a manner.

Feeding Geese.

Apart from the question of cost, geese can be spoiled by too much hand-feeding, as if too much is fed they are likely to get over-fat and mope about instead of foraging. Where environment is good, all that is required is a light evening mash during the winter and early spring. The mash may consist of equal parts by measure of pollard, bran, and greenstuff, or boiled vegetables mixed crumbly with skim-milk. A little grain may be given as a change, but it is advisable not to feed too much grain. The evening meal will induce them to return home.

There is at times a prejudice against keeping geese, on account of their manure tainting the grass and other stock not caring to graze after them, but this is really due to the fact that too many geese have been kept on a small area.

—C. J. C. Cussen, Chief Poultry Instructor.

On a property at Waipaoa a crop of maize is being grown on a paddock previously in various crops. The maize is showing strongest after lucerne and also after grass. Even after pumpkins and kumeras the maize is much stronger than after mangels, where the plants are comparatively weak with less foliage and have a poorer colour.

N.Z. Federation of Young Farmers' Clubs.

Edited by S. Freeman, Dominion Organizing Secretary.

Manawatu Clubs' Proposed Tour.

THE accompanying map, supplied by the Manawatu District Secretary, Mr. A. J. Galpin, indicates the proposed itinerary and districts to be covered by a tour planned for members of the Manawatu Clubs. The tour, which will be undertaken in May, will occupy about 11 days, during which members taking part will travel approximately twelve hundred miles by motor-bus.

The buses will start from Wellington, picking up representatives of clubs at various points on the way to the main rendezvous at Palmerston North. It is intended to camp at the various centres as follows: Hastings, Wairoa, Gisborne, Whakatane, Tauranga, Rotorua, and Chateau Tongariro. Arrangements for the hiring of cooking-gear, cooks, and transport are already well in hand.

Those responsible for the mapping-out of this tour have kept in mind the fact that camping will allow of costs being reduced to a minimum, thus placing the tour within the reach of all. The route selected should prove popular both from an educational and a sight-seeing point of view. The programme arranged in each district will give those taking part in the tour the opportunity of making comprehensive inspections of the main points of agricultural development and industrial interest.

It is expected that approximately one hundred Manawatu club members will be making the trip. The Manawatu District Committee is to be congratulated on its initiative in planning this camping tour.

Looking back on the activities already undertaken and so well carried out by this progressive District Committee, one need have no hesitation in saying that the success of the project is a foregone conclusion.

Map of the proposed Educational Tour being planned by the Manawatu District Committee, to be undertaken during May.

Grass-seed Production in the Kairanga.

J. B. Chrystall, Kairanga Club.

REMARKS in this article are of a practical nature, and will refer only to those heavy tangled crops which make the use of the binder and header harvester impracticable.

In the Kairanga it is possible to get anything up to 60 bushels of dressed seed per acre from a maiden crop. This first crop is the most profitable, for the second crop is usually at least 30 per cent. lighter in yield. The rye paddock must be clean and well drained, and evenly sown in the autumn with 2 bushels of rye-grass and 2 lb. of white clover. When the grass comes away, grazing with increasing numbers of sheep as the spring advances is carried out, to keep the pasture short and well stooled. Do not allow the grass to grow rank and then try and eat back.

The middle of October is the best time for shutting up, and early closing gives the rye a chance to beat the clover. Clover is necessary for the health of the pasture, but rather a nuisance in the harvest. It is impossible to get maximum yields of both rye-grass and clover in the one crop. It has been thought that shutting up a crop early causes the rye to lie down flat and results in poor fertilization, but nothing in the writer's experience has led him to believe that such a crop will have a poorer germination. His experience has proved that an early crop will yield at least a third more than one shut up a month or so later, and it should be obvious that there is twice as much profit in a crop yielding 43 bushels an acre, compared with one yielding 30 bushels. All thistles should be cut out before the rye-grass shoots to a head.

Fig. 1.—Dense mat of white clover covering the crop; yield of ryegrass-seed 40 bushels per acre (dressed seed).

It is now possible for the grower to take a handful of seed-heads gathered in late December to the Seed-testing Station at Palmerston North, where the percentage of fungoid infection can be determined, and at the last moment save a costly harvest and cut hay. It is advisable to do this in a wet season.

Cutting-time varies with the season, but is generally about the New Year, though it is important to wait until the seed is fully ripe. If the grower cuts his seed a few days too soon, he can probably get the same bulk of seed and still have good germination, but since 20 lb. make a bushel it is weight that is the goal. This weight cannot be obtained until the sap has risen out of the straw. Also, the maximum weight yield of a crop cannot be obtained until some of the seed starts to fall, since all the seeds on a stem do not fill at the same time.

Cocking or Rolling.

When it is decided to cut, assemble eight or nine men to each horse mower, and build two double rows of cocks from every eight swaths, so that a sledge track is left between the rows. Cock immediately after the mower. Fresh-cut crops handle better; no seed is likely to fall, and cocks settle better and are less likely to be disturbed by the wind. Cocks should be built neatly, the rye-grass heads in the centre, and each forkful criss-crossed so that the whole can be picked up cleanly as one forkful.

They should be about 2 ft. 9 in. in diameter at the base and 2 ft. or so high when built. All the cut crop must be cocked before night if the weather is at all uncertain.

If an abundance of clover is present in a crop, rolling the swath into rolls each 18 in. in diameter is the easiest and safest procedure—the more so if wet weather is encountered. Clover is hard to dry and easy to wet, but with the seed safely inside the roll it can be quickly and easily turned over, half a dozen times if need be. Rolls are quick and clean to load. (This method is illustrated in Figs 2 and 3.)

In eight to ten days from cutting the crop should be ready to thresh. The cocks or rolls are loaded, with the wind, on to sledges (two are sufficient). These sledges should be 12 ft. by 8 in., T. and G. floored, with a skirting-board around the edge to retain the seed that falls in the handling. A wind curtain, constructed from light timber and split sacks, 5 ft. high, and erected along one side of each sledge, is advisable, as this will also save seed and make loading quicker and easier. If these curtains are put on the right side of one sledge and on the left side of the

Fig. 2.—Preparing to roll the swath, instead of using the recognized method of cocking; this is made impossible by the strong growth habit of certified white clover.

other, the sledges can then be worked across the wind without any unnecessary walking by the loaders or the horses.

The straw is then hauled to a dump built on a large sack sheet which protrudes 2 ft. on every side. This dump should be large enough to allow the mill to start early in the mornings or to be built upon when the mill is stopped. The practice of feeding the mill direct from the sledges is not a good one. It results in the mill wasting time on dewy mornings and the crop waiting if a breakdown occurs. It is most important in rye-grass harvesting to concentrate on keeping the mill fully fed for the longest possible time each day, to shorten the harvest period and lessen the risk of running into bad weather.

The grower has to remember that the longer a crop is on the ground the more difficult it becomes to keep it dry, because of the growth of the clovers sealing the edges of the cocks from the drying effect of the wind. In this eventuality seed will be lost through having to lift and shift the cocks. The seed should not be dressed too clean at the mill, as this will merely result in good seed being blown into the straw stack.

Fig. 3.—The rolling in progress.

Analysis of Costs.

These figures are reached by accounting labour at 2s. 3d. per hour, standard mill and cleaning charges plus cartage of seed to seed-cleaning works, ten-miles radius:—

	£	s.	d.
Cutting	0	7	6
Cocking	1	1	0
Sledging	0	10	0
Milling	2	0	0
Cleaning	1	7	6
Carting	0	3	9
Sack hire	0	2	3
Total (per acre) ..	£5	12	0

These costs can be reduced by the use of farm labour and the farm mower, &c., but in the main they represent the present costs in producing rye-grass.

Field-day at Kaitaia.

Contributed by the Kaitaia Young Farmers' Club.

THERE was a large attendance at the field-day of the Kaitaia Club, older farmers, as well as Young Farmers' Club members, being present. Mr. T. H. Hankin, Government Veterinarian, gave a talk on tuberculosis in cattle, and afterwards demonstrated on a diseased cow. He explained that the disease was due to tubercle bacilli, which were spread from affected to healthy animals either through the respiratory or alimentary tracts. The demonstration showed the extent to which a beast could become affected with tuberculosis and yet live to spread infection broadcast, and when it was recognized that the disease is capable of control, the desirability of control in a promising district, such as Kaitaia, was considered self-evident. Mr. Hankin pointed out that the disease could be eradicated by the systematic use of the tuberculin test and the culling out of those animals shown to be affected.

Tuberculosis in pigs was touched upon, the connection between bovine tuberculosis and tuberculosis in the pig being stressed. It appeared that, to prevent the great economic losses due to tuberculosis at present occurring in stock, more consideration should be given by farmers towards controlling the scourge. After exhibiting the ravages of tuberculosis as shown by the demonstration on the diseased beast, Mr. Hankin briefly described the various organs of the cow, referring at the same time to the common diseases that might affect them.

Tour of Trial Plots.

Mr. E. B. Glanville, Instructor in Agriculture, conducted the party over a tour of inspection of the grass and clover strain trial plots laid down on Mr. J. Stewart's property. He explained and commented on the progress made by each plot in which different strains had been sown.

Prior to inspecting each plot individually, Mr. Glanville explained briefly the work that should be done to ensure the best pastures being produced. Three essential points were brought out—thorough cultivation, early sowing with good seed, and the provision of adequate plant food in the form of lime and phosphate. The main factor when establishing pastures was to be certain of good early establishment of white clover, for without white clover the other grasses would not thrive. White clover was the index plant, and if it were not included in a grass-seed mixture one could despair of the pasture. On country that would not grow white clover successfully, a legume such as subterranean clover or *Lotus major* must be encouraged.

Mr. Glanville said that in the North Auckland district white clover could be grown on practically any land capable of being ploughed. On hill country *Lotus major* could be grown, and on very dry country subterranean clover could be established. White clover required a consolidated seed-bed for good establishment, and that could only be obtained by thorough cultivation and the use of the Cambridge roller. The object of having a legume, such as white clover, in the sward was to supply plant-food in the form of nitrogen to the other grasses.

On gum country it had been found impossible to prepare a correct seed-bed without two ploughings. The idea was that the seed-bed needed to be consolidated from the bottom upwards, eliminating all air spaces. Rolling was

necessary on light land, such as volcanic and consolidated sand, but if the cultivation of heavy lands, such as gum land and clay flats, was carried out thoroughly it was often unnecessary to roll.

Early sowing, combined with good seed, was most important. There was certified and uncertified seed, and there was no need, Mr. Glanville stated, to reiterate which was best. The best time to sow was in February, and certainly not later than the middle of March, or it would be a gamble with weather conditions, the aim being to obtain a good white clover establishment before cold winter weather came in.

Use of Fertilizers.

Dealing with fertilizers, Mr. Glanville said this was a problem that had to be considered according to soil type. Some soils responded to super, others to basic slag, and others to super and lime. Recent research showed that the older the soil type the more necessary it was to use lime. On the majority of northern soils lime was definitely necessary in conjunction with phosphate. The lime prevented the phosphoric acid from becoming locked up in the soil with other elements, such as iron. If that happened, the response from phosphates was very disappointing.

Of the thirty plots, the first six were sown in strains of rye-grass, including certified mother seed, certified permanent pasture, and short-lived types. With these was sown mother seed white clover. The point emphasized by Mr. Glanville in connection with these plots was the necessity for establishing white clover, as, without this, the other grasses did not develop into a good pasture. The difference in the strains of rye-grass, especially the short-lived types, was very noticeable, indicating clearly that it undoubtedly pays to use certified seed.

The next five plots were sown in various strains of cocksfoot, including Akaroa, Plains, and imported strains. The trials showed the superiority of the Akaroa strain to the others. The imported strains made poor growth and produced only a small amount of herbage. The cocksfoot strains were sown with a mixture of certified permanent pasture rye-grass (25 lb.), Italian rye-grass (5 lb.), certified white clover (3 lb.), and Montgomery red clover (3 lb. per acre), the cocksfoot being sown at the rate of 10 lb.

Strains Varied.

Further plots were sown with different strains of white clover. The strains included certified mother seed, certified permanent pasture, New Zealand ordinary, Kentish wild white, and imported Dutch. The outstanding feature was that the certified mother and permanent pasture had established well and were producing a large, leafy type of white clover, with a very vigorous habit of growth, whereas the New Zealand ordinary had made only a fair strike, the plants being small and lacking in vigour and in no way tightening up the sward, as in the certified strains. The Kentish wild white, a small-leafed clover, showed vigorous growth and was closing up the sward, giving the impression that it would be an excellent clover for sheep pasture.

The plot sown with imported Dutch showed that this strain was a very poor type. It was small, stunted, and open, and had established badly. In this plot it was noticeable that the rye-grass was lacking in vigour through not being supported by a good type of white clover. The rye-grass was harsh and had an unpalatable appearance, stressing the point made by Mr. Glanville that success in growing rye-grass or in establishing a highly productive pasture depended on good establishment of strong-growing white clover of the right type, such as was obtainable when using certified seed.

A number of plots were sown in red clover, including Montgomery red and broad red (commonly called cow-grass). Montgomery red is a type fairly new to New Zealand, and Mr. Glanville showed the difference between the two types, Montgomery red being fairly late and a tighter-growing plant with smaller leaves than the broad red. Other plots contained, in addition to the base mixture, strawberry clover, alsike, timothy, crested dogstail, subterranean clover, and paspalum. Mr. Glanville identified the various specimens, and explained the soil conditions under which each should be sown.

Field Day at Kaitaia.

Mr. T. H. Hankin, Government Veterinarian, conducting a post-mortem on a diseased cow. The Kaitaia Club is the most northerly club in the Dominion.

Visit of United Kingdom Members.

MEMBERS of the New Zealand touring team at present visiting Australia will return by the "Awatea," arriving at Wellington on Tuesday, 19th April. Club members throughout New Zealand will be interested to learn that the four United Kingdom Y.F.C. members who have accompanied the New Zealand team during the Australian tour will be travelling to Wellington with them and will stay in the Dominion for nearly three weeks, leaving Auckland on 9th May for Sydney, from where they return to England on 13th May.

Arrangements are being made for the visitors to divide their time between the North and South Islands. They will be suitably entertained, and shown as much of the farming and other sides of the various districts as their comparatively short sojourn in this country will allow. New Zealand club members will have the opportunity of meeting them in the various centres in which they will be staying. An itinerary of their tour in the Dominion will be published at an early date.

It is hoped that the visit of the New Zealand team to Australia and the visit of the United Kingdom members to this Dominion will be forerunners of many happy Y.F.C. exchanges between all parts of the Empire.

The New Zealand members on their return home will have been away for more than ten weeks. Fellow-members are looking forward with pleasure to seeing them again, and learning through these columns something of their activities in Australia.

Taranaki Clubs Tour South Island.

A PARTY of fifty members of the Taranaki clubs recently undertook a very successful tour of the South Island, leaving Hawera on Saturday, 19th March, and returning on Saturday, 2nd April. The tour was conducted under the auspices of the Taranaki District Committee, and was organized by the local District Secretary, Mr. J. E. Davies, of the Department of Agriculture, Hawera. Mr. H. D. Lambie (Mangatoki), a member of the South Taranaki Farmers' Union, accompanied the party as president, Mr. E. Gane (Normanby) acted as treasurer, and Mr. J. E. Davies as secretary for the tour.

The touring party consisted of representatives of the following clubs: Alton, Cardiff, Kaponga, Lowgarth, Pukengahu, Toko, Waverley, and Whenuakura. The members journeyed to Wellington by train, crossing to Lyttelton at night by the "Wahine." Motor-buses were used for transport throughout the whole of the tour in the South Island, more than thirteen hundred miles being covered by this means.

The itinerary of the tour embraced the following districts: Christchurch, Ashburton, Timaru, Oamaru, Dunedin, Balclutha, Gore, Invercargill, and Alexandra. Very interesting and instructive programmes were planned in each district through the local District Committees, and stud breeders, agricultural farms, irrigation schemes, and places of industrial interest were visited. Socials such as morning and afternoon tea, lunch, &c., were arranged for the visitors by local clubs, as well as evening entertainments. Members of the party enjoyed fully what was not only a very comprehensive and educative tour, but also a wonderful holiday. On arriving in Wellington on the final stage of the return journey the party was conducted to Parliament Buildings by the Organizing Secretary, where the members were met by Mr. A. H. Cockayne, Director-General of Agriculture, who congratulated them on the success of their tour and on the progress of the movement generally. He then introduced them to the Hon. F. Langstone, Minister of Lands, who welcomed them in the absence of the Minister of Agriculture. The Minister spoke to them on the value of their organization to the farming community and to the country generally, and in the course of his address delivered to them a message from the Prime Minister.

Mr. Lambie, replying on behalf of the Young Farmers present, stressed the value of tours and exchanges of visits in linking up the Y.F.C. organization. Members of the party were shown over the Parliament Buildings, and before leaving unanimously elected Mr. Langstone an honorary member of the Y.F.C. organization, and presented him with a badge. The touring party left Wellington on the New Plymouth express, arriving at Hawera about 6 p.m.

Members of the Taranaki Club's party photographed at Christchurch during their recent tour of the South Island.

Among the Clubs: Reports on Activities.

Otago and Southland.

Alexandra.—Address by Mr. Kinnaird on his tour through Europe.

Arrowtown.—Lecture by Mr. G. G. Calder, Department of Agriculture, on "Grasses in Central Otago."

Crookston.—General discussion on club affairs; arrangements for entertainment of Taranaki touring party.

Enfield.—General discussion on club affairs; tour of the South; scholarships, radio broadcasting.

Lawrence.—Lectures by Mr. G. McDonald and Mr. Reid, "Distemper in Dogs," "Strangles in Horses," and "Navel Ill."

Middlemarch.—Discussion on the white butterfly, led by Messrs. S. H. Saxby and W. R. Lobb, Department of Agriculture. Those present were agreeably surprised to find that several of the chrysalids collected locally were parasitized.

Milton.—Arrangements for combined field-day with other clubs.

Moa Flat.—Talks by club members on "Tour of the North Island" (R. Morton), and "Tour of Central Otago" (J. A. Love).

Otama.—Lecture by Mr. W. Faithful, Department of Agriculture, on "Club-root and Brown Heart in Swedes."

Palmerston.—Mr. S. H. Saxby, Department of Agriculture, gave an address on the white butterfly and explained the measures being adopted for its control.

West Taieri.—Combined meeting with the Farmers' Union; Mr. S. H. Saxby, Department of Agriculture, gave an address on the white butterfly, and Mr. McDonald spoke on pigs, with a view to forming a pig club in the district.

Canterbury.

Amberley.—Discussion on the coming season's activities.

Darfield.—General discussion and arrangements for judging of the Y.F.C. stacking competition.

Dunsandel. — General business; arrangements for reception of Taranaki touring party.

Ladbrooks.—Arrangements for reception of Taranaki touring party. Club debate, subject: "That the Threshing-mill is Superior to the Header." The affirmative was taken by M. Meyer, D. Maclaughlan, and A. Coleman, and the negative by L. Carpenter, C. Watson, and F. Nolan. The judge, Colonel J. Stafford, awarded the decision to the supporters of the affirmative, and complimented the speakers generally.

Oxford.—Arrangements for reception of the Taranaki touring party, and also for the club's annual meeting in April.

Springston.—Lecture by Mr. J. W. Calder, Lincoln College, on "Cultivation and Soil Fertility."

Manawatu.

Apiti.—Arrangements for a debate with the Farmers' Union; lecture by Mr. E. W. Barnett, of Tokarangi, on "Hill-country Management."

Halcombe.—Lantern lecture on "Top-dressing" by Mr. A. W. Hudson, Massey College.

Johnsonville.—Lecture by Mr. P. B. Lynch, Department of Agriculture, on "Top-dressing as it Affects the Dairy-farmer."

Kairanga.—Lantern lecture by Mr. A. W. Hudson, Massey College, on "Top-dressing."

Kimbolton-Kiwitea.—Address by Mr. L. J. Wild, Principal of Feilding Agricultural High School, on his overseas tour. Mr. Wild dealt with farming and other points of interest in America, England, and Europe generally.

Levin.—Address by Mr. Graham, Weraroa Boys' Training Farm, on "Gardening." Debate on "Sheep-farming *v.* Dairy-farming," supervised by Mr. Hercock, Manager of the Boys' Training Farm. A field-day was held on Mr. Law's property, Te Rohenga, Shannon; Mr. Law demonstrated on Romney sheep.

Otaki – Te Horo. — Annual meeting; general business. Mr. S. Freeman, Dominion Organizing Secretary, outlined the activities of the organization throughout New Zealand. Messrs. A. J. Galpin and G. S. Robinson, Department of Agriculture, addressed the meeting on the proposed Manawatu Y.F.C. tour, and a suggested debating contest respectively.

Woodville.—Address by Mr. Seddon on "Farm Law."

Wairarapa.

Ballance.—Annual meeting; general business; guessing competition to be arranged to raise funds. A combined field-day was held in conjunction with the Mangatainoka Club in Pahiatua, more than sixty members and older farmers attending. The following demonstrations were given: Friesian cow (Mr. H. R. Green, Kairanga); educating a horse (Mr. J. B. Carruthers, Eketahuna); Aberdeen Angus cow and Romney sheep (Mr. A. C. Morton, Massey College).

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Carterton.—Annual meeting; discussion of programme for coming year.

Greytown.—Lecture on "Agriculture and Education" by Mr. Maloney. Arrangements for dance at Morrison's Bush.

Masterton.—Field-day, taking the form of stock-judging on various farms around Masterton, as follows: Mr. D. Buchanan's property (Shorthorns), Mr. J. M. James demonstrated; Mr. William Moore's property (Ayrshires), Mr. Moore demonstrated; Mr. L. T. Daniell's (Romneys).

Wanganui.

Bulls.—Debate on "Dairy-farming *v.* Sheep-farming," won by the supporters of the former.

Hunterville.—Debate on "Grassland Farming *v.* The Use of the Plough."

Poverty Bay.

Gisborne.—T. White (a club member) gave an excellent address on "Wool," and K. Cooper (also a club member) gave an interesting and instructive lantern lecture on "Insect Pests." Mr. Cooper is chairman of the Poverty Bay District Committee.

Nuhaka.—Paper by N. J. Alexander (club member) on "The Care of Horses' Feet." Lantern lecture by K. Cooper (member of the Gisborne Club) on "Insect Pests," using slides showing the work carried on by the Cawthron Institute.

Te Karaka.—Lantern lecture on "Insect Pests," by K. Cooper (Gisborne Y.F.C., and chairman of the Poverty Bay District Committee). Arrangements for annual meeting; meeting to be followed by short addresses and musical items.

Tolaga Bay.—Lantern lecture on "Insect Pests" by K. Cooper (Gisborne Y.F.C.). Papers: N. Sadler, "Trip to Auckland," and D. Jones, "Selection of the Boar."

Bay of Plenty.

Edgecumbe.—Address by Mr. F. J. Reynolds on "Parts of My Tour Abroad." Mr. Reynolds dealt with farming conditions in the British Isles, butter and cheese grading-stores in London, the World's Grassland Conference in Wales, and the Coronation.

Kati Kati.—Practice debate held in preparation for the second round of the Bay of Plenty Y.F.C. debating contest. The subject for the debate was "That a Combination of Cropping and Pastures is more Profitable than All-grass Farming."

Paengaroa.—Field-day at the Bay of Plenty Dairy Factory. The members were addressed by Mr. T. R. McCarthy, manager, and a cream-grading demonstration was given by Mr. W. G. Batt, Government Dairy Instructor. The factory water-supply was also inspected.

Opotiki.—Arrangements regarding dance and debate. Lecture by J. D. Caves (club chairman) on "Buckwheat."

Waimana.—Arrangements for dance. Practice debate in preparation for second round of debating contest.

Rotorua.

Horohoro.—Addresses on the pig-club movement by Messrs. Pearson, Beattie, and Stragnell; lantern lecture on "Pig Husbandry" by Mr. Pearson.

Ngakuru.—Lantern lecture by Mr. Pearson on "Pig Husbandry"; address by Mr. Beattie on "The Building-up of a Pig Club."

Putaruru.—Addresses by Mr. Harrington on "Pigs," and Mr. C. Potts on "Sheep and Fat Cattle."

Te Kuiti.

Aria.—Lecture on "Certified Seeds" by Mr. K. M. Montgomery, Department of Agriculture.

Auckland.

Mangatawhiri.—Mr. R. C. Clark, Principal of Wesley College, gave a talk on the methods he found most effective and economical for the grassing of clay lands. Arrangements made for dance and field-day.

North Auckland.

Marohemo-Maungaturoto.—Addresses by the Dominion President, Mr. W. F. McLaren, and the Organizing Secretary, Mr. S. Freeman, on the history of the movement, and Y.F.C. activities throughout the Dominion. Mr. E. H. Arnold, Department of Agriculture, made arrangements with the club for a field-day in the Northern Wairoa district.

Oruru.—Talks by the Dominion President, the Organizing Secretary, and Messrs. E. B. Glanville and Mr. E. Moss (Department of Agriculture), on Y.F.C. activities and progress.

Visitor from West Australia.

THE Organizing Secretary received a visit during March from Mr. Gordon Weller, Chairman of the Waroona Junior Farmers' Club, Western Australia. His stay in New Zealand was very short, as he arrived in the Dominion by the "Strathmore" on a holiday cruise.

He was very keen to acquire information regarding the Y.F.C. organization in this country. The Junior Farmers' movement in West Australia is at present in its infancy, and there are only about twenty clubs in existence. He was very interested in the progress of the movement in New Zealand, particularly in regard to stock-judging competitions and tours. He brought first-hand news of the New Zealand and United Kingdom touring members, in whose company he travelled on the "Strathmore" from Adelaide to Sydney. He stated that they were all fit and well, and having a wonderful time, being full of praise of the treatment meted out to them in Australia, and of the interesting programme that had been arranged for them.

New Constitution Approved.

AN extraordinary general meeting of the Federation was held in Wellington on Friday, 25th March. The proposed new constitution, a draft of which was cirulated among clubs recently, was approved, with a few slight alterations to correct minor anomalies that had been overlooked in preparing the draft.

The new constitution comes into operation at the annual meetings of clubs, which will be followed by district annual meetings. Copies of the constitution will be forwarded to all club secretaries at an early date. In the meantime, the rules as set out in the draft submitted to all clubs can be taken as correct so far as clubs and club procedure are concerned.

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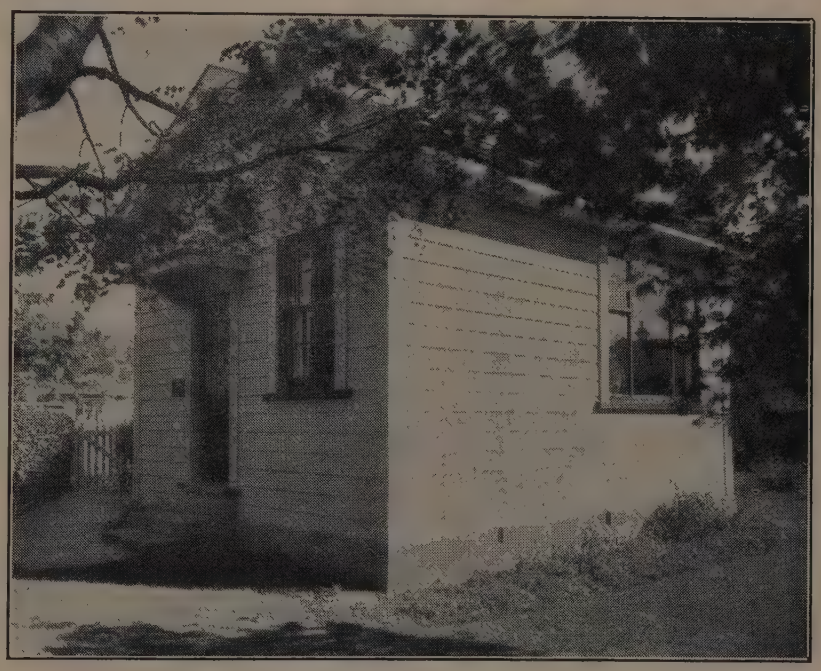
Health Notes for the Farm.

Contributed by the Department of Health.

Need for Care of the Teeth.

Danger from Invisible Enemies.

One of the most pleasant features about being born as I conceive it is that we are born without teeth. I believe there have been a few exceptions to this rule. Richard the Third, according to the accounts, came into the world equipped with all his teeth and a perfectly miserable disposition. In the main, however, we are born without teeth, and we are fairly well content with life until the teeth begin to come. First there are the milk teeth. To use the term commonly in use, we cut them, although as a matter of fact they cut us—cut them with the aid of some nursy thing as a toothing-ring or the horny part of the nurse's thumb, or the reverse side of a spoon—cut them at the cost of suffering not only to ourselves, but for everybody else in the vicinity.—Irvin Cobb.



School dental clinic to accommodate one nurse.
This building consists of an operating-room, waiting-room, and dental nurse's room. This clinic is at Upper Hutt.

THE baby usually cuts his first tooth when he is between six and nine months old. These primary or milk teeth should all be in place by the time he is two and a half years of age. When a child is about seven years of age the first of the temporary teeth begin to loosen and drop out, being gradually pushed out of place by the permanent teeth, until, at the age of twelve or fourteen, they have all been replaced. The last of the permanent molars do not come in until adult life, and on that account are called the wisdom teeth. In a considerable number of people these wisdom teeth never erupt at all.

There are thirty-two permanent teeth. The first to make its appearance is the first molar, or double tooth, called the six-year molar. It is a most important tooth, because it comes in behind the temporary teeth and its location determines the position of all the other permanent teeth. It has been truly called the "keystone of the arch." Parents sometimes want this tooth extracted, not realizing that it is such an important tooth. If the temporary teeth are lost too soon and the keystone tooth, as a result, comes in too far forward, or if this important molar is lost through decay, it is almost impossible to have the regular teeth that add so much to one's appearance. By counting the teeth, beginning at the front and going towards the back to the sixth tooth, these permanent molars are found.

Invisible Enemies.

A strange masterpiece of Nature is this little bit of ivory-like material we call a tooth. It is so hard that years and years of grinding do not wear it out, and yet in a few months it can be destroyed by enemies a thousand times smaller than the eye can see. The part of the tooth which we can see is called the crown, and it is covered with a pearly white enamel, which is the hardest substance in the body. This enamel should be carefully protected from injury, and one should not use one's teeth on things that might crack them. The other part of the tooth, the root, fits into a socket in the jaw-bone.

Most of the tooth is made up of a bony substance called dentine, but in the centre of it is a pulp containing the blood-vessels and nerves which give the tooth nourishment, life, and feeling. Sometimes, when we moan in the grip of toothache, we wonder why teeth need to have these nerves. But we should think of the nerves as good watch-dogs which warn us of the presence of danger. When a tooth is aching it means that it is in danger of its life and that it needs attention. Nature levies heavy fines for neglect. Healthy teeth seem to us to give rise to no sensation. If, however,

their pulps become exposed they can be the source of excruciating pain.

Diet in infancy and childhood plays an important part in the causes of dental caries. Mother's milk is, of course, the best possible diet for infants. Breast milk contains exactly what is wanted in the best form, and suckling ensures better exercise for the jaws than the best bottle-feeding. It causes a freer flow of blood to the whole mouth, jaws, and gums where the "ivory builders" and "enamel builders" are engaged working their hardest to get through their contracts. By taking plenty of outdoor exercise, breathing pure, cool air, and leading a well-regulated life as regards food and habits the mother can ensure for herself pure, wholesale, nourishing blood.

Value of Prevention.

"The study of teeth impresses us," states an authority, "with one point—the prevention of dental caries begins before the child is born." The Department's booklet "The Expectant Mother and the Baby's First Month" gives advice on such matters and is obtainable free of cost at the child-welfare clinics. The mother's blood is the first thing necessary, not only for the building-up of her baby's teeth before birth, but also for establishing a proper supply of breast milk for the baby, with which to continue the good work in the case of the permanent teeth.

For six months onward the jaws of a baby should be gradually habituated to munching and chewing. First the baby can be given a bare bone, for instance, and later on he should have successively tough crusts, crisped dry bread, hard plain biscuits, and raw, ripe apple, instead of being papped. Beginning with tough crusts about the ninth month and such food as mentioned, the child should have vegetables as he grows older and is able to cope with them. Soft, sickly food such as sweet biscuits, cake, caramels, and chocolate should be avoided, because they tend to lodge between the teeth and cause decay to set in. Meals should be perfectly regular and never hurried, and food should be well masticated. The inclusion in the diet of green vegetables and fresh fruit is most desirable, especially at the end of a meal.

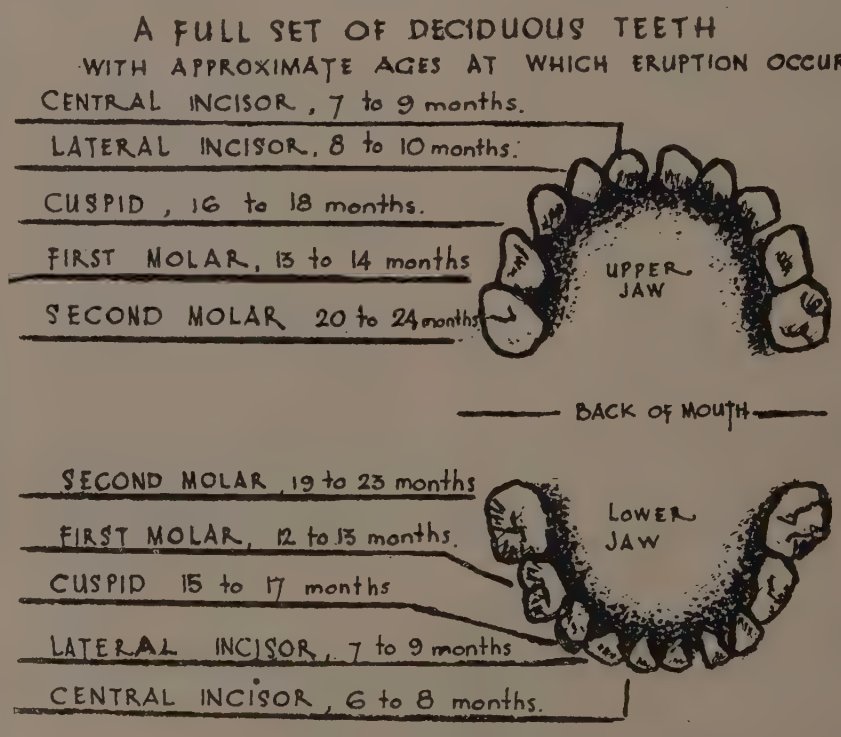
The exercise from the chewing of solid food is of benefit in many ways. It not only keeps the teeth sound, but it also massages the gums and keeps them pink, firm, and healthy, and the exercise of the jaw-muscles helps to develop a properly shaped face. Should teething be accompanied by disturbances in the condition of the child—catarrh or bronchitis—for teething sometimes produces more than teeth, the advice of the Plunket Nurse or of your own doctor is always available.

Perfect, capacious jaws and sound, beautiful teeth cannot be built without fulfilling the simple and universal requisites for health throughout babyhood and childhood. The type of diet of the early Maoris which compelled vigorous mastication—fern-root and the like—is said to have resulted in their having such splendid teeth, remarkably free from dental caries. It is not so now, when many Maoris live upon the same food as the pakeha.

Frequent Cleaning Desirable.

Since clean teeth seldom decay it is important to wash the mouth after each meal, and to brush the teeth with salt and water or a mild dentifrice before going to bed and again in the morning. Special care should be taken to brush all surfaces of the teeth, and especially the back ones. The dental nurse or dentist will show the correct way to do this. No careful housewife will leave her plates and dishes dirty after a meal; least of all would she serve them up in that state for the next meal. Yet that is what often happens with children's teeth. Between meals children often eat sweets which are sticky, and these add to the mischief. The result of all this uncleanliness is that the teeth are softened by the process of putrefaction going on around them and the microbes attack the teeth themselves, and decay starts and quickly spreads. The greatest amount of dentistry is necessary in mouths that are dirty, so it is important to wash the mouth out after each meal and, as already stated, to brush the teeth before going to bed and again in the morning. This applies to adults as well as to children.

Natural cleansing of the teeth is promoted by eating uncooked natural foods such as fresh fruit, celery, lettuce, and tomatoes. Milk, butter, and eggs and vegetables are also valuable articles of diet from a dental point of view. Artificial teeth should also be kept scrupulously clean. It is well known to dentists that unless extreme care is taken the natural teeth in proximity to a partial denture have a great tendency to become diseased. The wearing of such a denture does not alter the structure of the teeth, but it obviously provides exceptional facilities for the stagnation and fermentation of food debris.


A FULL SET OF DECIDUOUS TEETH
WITH APPROXIMATE AGES AT WHICH ERUPTION OCCURS.
CENTRAL INCISOR, 7 to 9 months.
LATERAL INCISOR, 8 to 10 months.
CUSPID, 16 to 18 months.
FIRST MOLAR, 13 to 14 months
SECOND MOLAR 20 to 24 months
UPPER JAW
BACK OF MOUTH
SECOND MOLAR, 19 to 23 months
FIRST MOLAR, 12 to 13 months.
CUSPID 15 to 17 months
LATERAL INCISOR, 7 to 9 months
CENTRAL INCISOR, 6 to 8 months.
LOWER JAW

A child's digestion depends upon the efficiency of the teeth in chewing food. If a child has a decayed tooth he will chew only on the one side. If he should have a decayed tooth on each side you can readily see that he will do very little chewing and will practically bolt his food. This may mean stomachache and castor-oil, so the first teeth should, for health reasons, be cared for.

Then there is the facial appearance of the child. The first set of teeth practically

paves the way for the permanent set, and if the first teeth, or a number of them, are lost too soon the permanent teeth try to grow into a space that was not made large enough for them before the first teeth were lost. Then arise the crooked and irregular teeth that tend to spoil the child's appearance, and, in fact, change his whole facial expression. There should be no neglect of the first teeth when facilities exist for their treatment by the skilled officers of dental clinics and by the members of the dental profession in private practice.

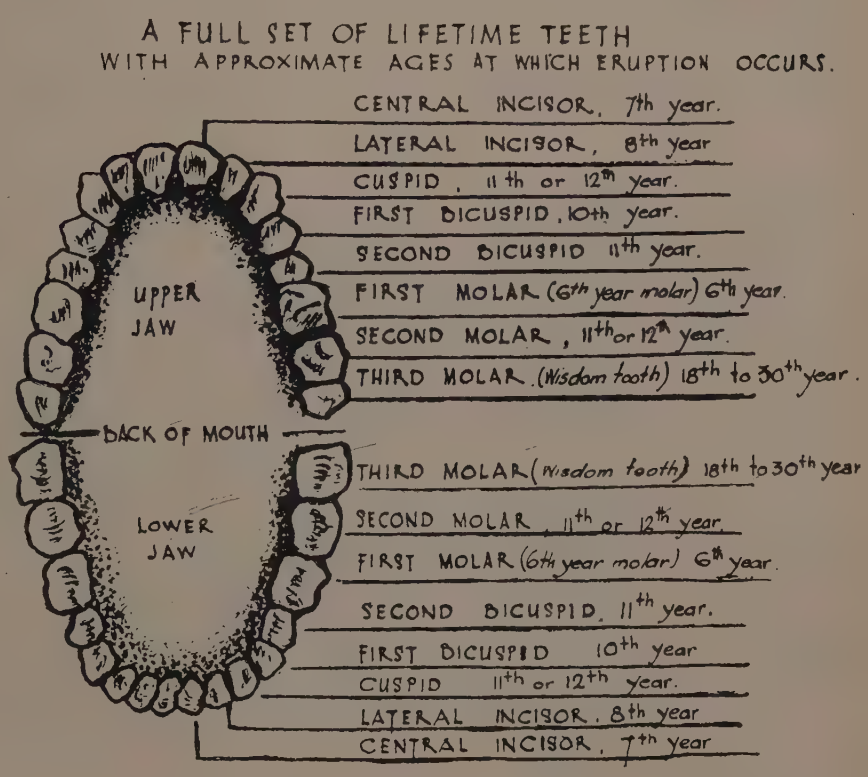
Ages for Shedding Teeth.

Probably few mothers know the exact or even approximate age for the shedding of each baby tooth, yet the losing of these temporary teeth at the proper age is of utmost importance. A baby tooth that is supposed to fall out at the age of six must not be allowed to remain in a child's mouth until he is ten, and the baby tooth that is supposed to fall out when the child is ten years old should not be drawn when the child is only six. Retaining baby teeth too long is just as harmful as the premature extraction of them. Both conditions lead to produce crowded and crooked teeth, protruding jaw-bones, and distorted features.

This checking up by our officers at the dental clinics on the temporary teeth will more than remunerate parents for their care and trouble in satisfaction, pride, and happiness when their children gradually develop two rows of pearly teeth and a well-shaped contour of chin and cheek. Careful dental supervision of the first teeth is doing more to develop beautiful faces than all the cosmetics manufactured.

How vitally important it is to have the first molar or double tooth carefully watched and attended to if necessary. Children should early be accustomed to have their teeth examined, and the confidence gained by a painless visit to the dental clinic or to the dentist is of great value not only in treatment of the temporary teeth but also of permanent ones.

When a tooth does ache the child should be taken to a dentist at once; the dentist will find and remove the cause of pain. More important still is to take the child periodically to a dentist to prevent trouble arising.


A FULL SET OF LIFETIME TEETH
WITH APPROXIMATE AGES AT WHICH ERUPTION OCCURS.
CENTRAL INCISOR, 7th year.
LATERAL INCISOR, 8th year
CUSPID, 11th or 12th year.
FIRST DICUSPID, 10th year.
SECOND DICUSPID 11th year.
FIRST MOLAR (6th year molar) 6th year.
SECOND MOLAR, 11th or 12th year.
THIRD MOLAR (Wisdom tooth) 18th to 30th year.
UPPER JAW
BACK OF MOUTH
LOWER JAW
THIRD MOLAR (Wisdom tooth) 18th to 30th year
SECOND MOLAR, 11th or 12th year.
FIRST MOLAR (6th year molar) 6th year.
SECOND DICUSPID, 11th year.
FIRST DICUSPID 10th year
CUSPID 11th or 12th year.
LATERAL INCISOR, 8th year
CENTRAL INCISOR, 7th year

Delay is Unwise.

Bear in mind that delay in having teeth attended to is unwise, as one tooth infects the mouth and causes decay of others. If decay is extensive the tooth may have to be extracted. This is a calamity, because missing teeth interfere with mastication and with the growth of the jaw and tend to spoil the shape of the face. Artificial teeth are a poor substitute for sound, natural teeth, and one cannot believe that the day will ever come when men and women will prefer an artificial denture to Nature's outfit.

If you wish to keep the teeth which Nature has given you and to be hale and hearty in old age, you should take care of your teeth now. The secret of painless dentistry is knowing when to go to a dentist and how often to return. This is the day of prevention, but no matter how faithfully our dental officers, nurses, and members of the dental profession do their part, unless you do yours they cannot accomplish much. Therefore, look well to your teeth! Guard them by daily care, by proper food, and by regular visits to the dentist. The ancient axiom that "a stitch in time saves nine" is particularly true to-day in the field of preventive dentistry.

Beautiful arches of clean, sound teeth are among the greatest gifts that Nature can bestow upon us, but we must remember that Nature gives us this gift to keep only on the condition that we take care of it. They are part of the human body and need to be guarded just as do the eyes. There is need of a wide appreciation of the value of the care of the teeth in childhood, adolescence, and adult life.

Without good, sound teeth one cannot expect to build a good, sound body.

SUITABLE DRESSING FOR CANVAS TARPAULIN.

R. H. T. (Otane) :—

Could you let me know of a suitable dressing for a green canvas tarpaulin that will preserve it, make it waterproof, and, if possible, make it obnoxious to rats and mice?

Fields Division :—

A cheap and effective method of treating a canvas cover to preserve it is to soak the cover in a solution of copper sulphate (bluestone), using 1 lb. of bluestone to 10 gallons of water. The bluestone solution should be made in a wooden or concrete trough. The bluestone dissolves more rapidly if suspended in the water in a bag. This treatment does not actually make the tarpaulin waterproof, but it prevents rotting, and therefore preserves the waterproof qualities. Bluestone is poisonous, and the treatment would be a protection from rats and mice. The treatment is used also for stack covers made of fertilizer bags, and renders them serviceable for some years instead of for one season only.

Founders of Modern Agriculture.

J. W. Woodcock, Fields Division.

Thomas Coke.

ALTHOUGH Thomas Coke, Earl of Leicester (1752–1842) had a distinguished career in the realm of politics, it is chiefly as a pioneer in the establishment of the demonstrational farm that he has become famous in economic history. His work in the development of Holkham Estate in Norfolk, and the gatherings of farmers to view his experiments, made Coke one of the outstanding personalities among the founders of modern agriculture.

These gatherings of farmers organized by Coke were described as "Coke's Clippings," and, while they began in a simple way with the shearing of sheep, they soon came to embrace the whole of the rural industry. At first a few local farmers attended, but later agriculturists from all parts of Great Britain asked if they might attend, and celebrities from the United States and the Continent travelled to England to take part in these meetings. At these gatherings Coke presented many prizes for new agricultural inventions, for suggestions in regard to improved systems of cropping, and for articles on agricultural subjects.

"Coke's Clippings" generally lasted three days, and were eventually attended by several thousand people who, usually on the first day, proceeded to inspect the farms on the estate and listened with absorbed interest to the lectures of their host. Prize cattle, new implements, sheep-shearing, and farm crops were discussed. The second day was devoted to farm schools and cottage gardens. On the third day the carcasses of slaughtered animals were inspected, and speech-making with the distribution of prizes completed the proceedings.

When Coke came into his heritage the farms on his estate were practically sterile, his knowledge of agriculture was extremely limited, and his tenants were, in the main, lazy and indifferent. By his determination to learn the latest methods and his own experiments he succeeded in raising the parish from poverty to affluence, and it was his boast that he turned West Norfolk from "rye and rabbits" into a wheatgrowing district.

His main idea was to stock heavily, and he conceived the idea that cattle were more valuable as producers of manure than of meat on the light Norfolk soil. His motto was "Muck is the mother of money," and he encouraged his tenants to build cattle-yards and keep more live-stock.

"Coke's Clippings," modern style—a farmers' field-day.

By this example Coke was able to show the value of many innovations which were hitherto treated with distrust. Thus, he popularized the drill invented by Tull, and was able to show visitors to his farm how it improved the yield of barley.

It is difficult in such short space to describe all the achievements of this great personality. He experimented with all kinds of crops, cocksfoot was cultivated with great success, and it was he who, recognizing the merits of swedes, was the first to grow them on a large scale. He discarded the native sheep of Norfolk in favour of Southdowns, and he improved the Suffolk breed of pigs by judicious crossing. He introduced the idea of heavy stocking to increase fertility, and helped to lay the foundations for the introduction of crop rotation.

His influence on agricultural improvement is incalculable and his fame rests far more on his services to rural progress than to his reputation as a politician or a society leader.

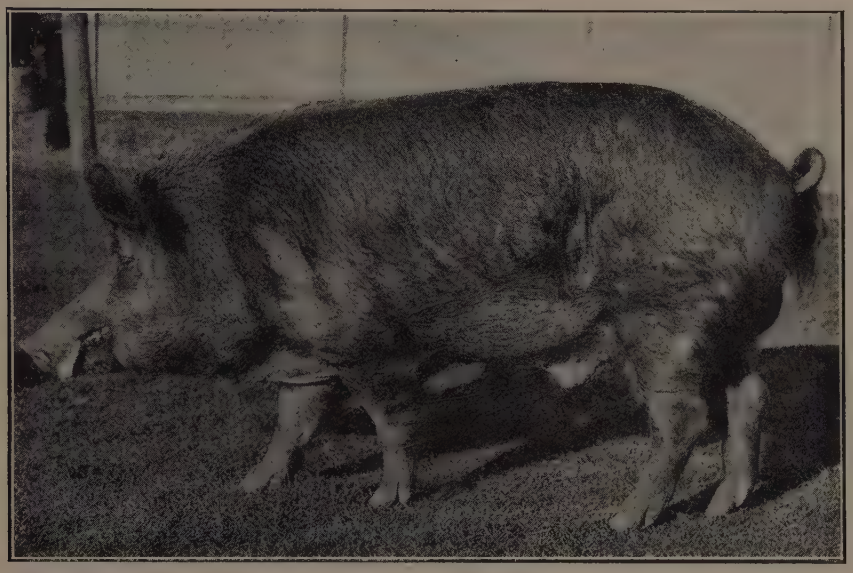
(To be continued.)

HONEY-GRADING DATES.

THE following are the remaining dates for this year arranged by the Department of Agriculture for grading. Producers are asked to arrange for their honey to arrive at the Grade Store three days before the commencing date.

—	April.	May.	June.	July.
Auckland	..	2– 6	6–10	28–29
New Plymouth ..	..	9–10	..	4– 5
Wellington	..	12–13	..	7– 8
Lyttelton	..	16–17	..	12–13
Greymouth	20–22	19–20	..	15–16
Smithfield	25–26	23–24	..	18–19
Dunedin	27–28	26–27	..	21–22
Bluff	29–30	30–31	..	25–26

Special Pig Supplement.



Grading of Baconer Pigs.

The Importance of Restricted Feeding.

C. E. Ballinger, Assistant Experimentalist, Ruakura.

THE criticism levelled at New Zealand baconer pigs is that they are too short and too fat. Since baconers are paid for on the basis of back-fat thickness in England, this criticism can be taken to mean "increase the length of your pigs and thereby reduce the back fat." While there is no doubt that increasing the length does reduce the back-fat thickness, it usually fails to do so unless some care is exercised, especially in the later stage of feeding. At present the general method of fattening in New Zealand is to feed the pig as much skim-milk or buttermilk as it will consume throughout the fattening period. In Denmark and other countries where high-grade bacon is produced some restriction of the ration is imposed, especially over the latter part of the fattening-period. In Britain a maximum of 5 lb. to 6 lb. of meal is common, which in terms of skim-milk is 5 gallons to 6 gallons, and is the ration of a 120 lb. pig under New Zealand's full-fed system. In Germany the Lehmann system of pig-feeding forms another method of restricted rationing. Under this system the pig is fed to a maximum of 2·2 lb. of grain, and the remainder of the ration is made up with a bulky ration of roots, sugar beet, or potatoes. This is a method of full feeding a restricted ration, since a pig can consume considerably more feed units as grain than as roots.

Baconers—A Safety Valve.

At present bacon is produced with pigs primarily designed for pork, and we produce bacon because the dairy-farmer at certain seasons of the year has too much feed and at other seasons too little for the fattening of his porker pigs. In the late spring and early summer the pigs available may be insufficient to cope with the separated milk-supplies unless carried to bacon-weights. In the autumn and winter supplies of separated milk are often insufficient to finish pigs to porker-weights. These pigs are carried over the winter in a store condition and fattened for bacon in the spring. Our bacon then is produced when feed is plentiful, and pigs are fed an unrestricted ration, with the result that a great deal of over-fat bacon is produced.

The restriction of the ration in pig-fattening is of extreme importance in New Zealand since it has a direct bearing both on our methods of wintering pigs in store conditions and our rapid fattening in spring and summer. It is found that if pigs are well fed from three weeks of age until they reach 100 lb. to 120 lb. live-weight, followed by a ration restricted to 5 lb. to 6 lb. or gallons of feed per day

per pig, the pigs produced by such feeding are of the lean type of carcass desired for present consumption. If, on the other hand, such pigs are full fed throughout their lives they will be too fat at bacon-weights.

If such pigs are well fed until they are 40 lb. to 60 lb. weight, followed by a store period and slow growth for about three months—*i.e.*, until they reach 80 lb. to 100 lb., followed by a rapid fattening period of two to three months, the resulting carcasses will be overfat. If, however, the pigs that have experienced the store period of three months are placed on a ration of 3 lb. to 4 lb. of meal or gallons of milk, with a maximum of 4½ lb. to 5 lb. of meal or gallons of milk, the resulting carcasses will be quite satisfactory.

It is not difficult to see the bearing these methods of fattening have on New Zealand methods. In order to provide practical information on the problem trials have been conducted at the Ruakura Farm of Instruction in which pigs were wintered and fattened by the different methods outlined above. Spring-born litters were fed at different levels of nutrition and rates of live-weight gain. Pigs were also wintered on roots, meat-meal, and maize for three months at slow rates of growth. This store period was followed by fattening at different rates of feeding and with rations comprising buttermilk, skim-milk, roots, maize, &c. The chief points investigated were the reduction in back fat by restricted feeding as compared with full feeding, and the value of roots in the fattening ration and the extent to which they could be fed.

Effect of Restricted Feeding.

All pigs used in the trials were first-cross Berkshire-Tamworths, and in order to obtain information on the effect of restricted rations on this type of pig thirty which were born in spring were placed on skim-milk only when they reached 60 lb. live-weight. These pigs had been well fed from birth and averaged 40 lb. or better at eight weeks. At 60 lb. they were placed in three comparable groups of ten and placed on their respective rations. Two groups were stied and the third pastured.

The following table indicates the rations fed and the degree of restriction imposed :—

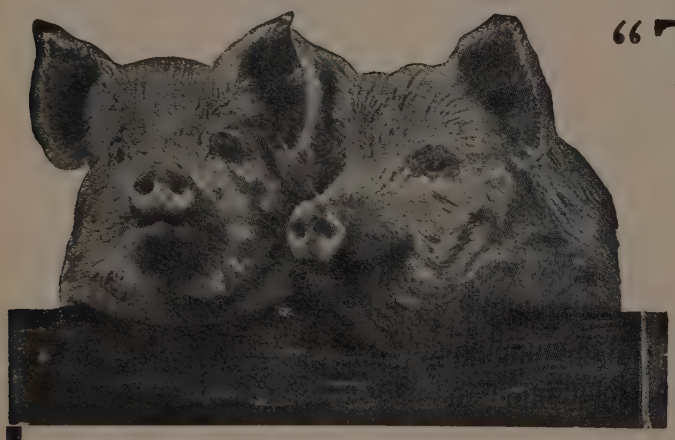
Feed Table.

Live-weight (lb.)	60	75	100	125	150	175	200
Full-fed group (gallons)	3	3½	4½	5	5½	6	6½
Restricted groups	2¾	3	3½	4	4	4	4½

It will be seen that the "full-fed" group received considerably less than is "full fed" on the dairy-farm or commercial piggery, the ration being in keeping with British method of feeding for bacon-production.

The carcasses were examined at slaughter for back fat, &c., and the following means obtained :—

	Weights (Pounds).		Killing (per Cent.).	Length, Hip Bone to First Rib (Inches).	Back Fat (⅛ in.).		Rate of fattening Pounds, Pig/Day
	Live.	Carcass.			Shoulder.	Loin.	
Group 1 : Full fed (sty)	201·7	147·0	72·7	29·7	14	9	1·0
Group 2 : Restricted (pasture)	201·1	142·9	70·9	29·2	13	7	0·8
Group 3 : Restricted (sty)	199·9	148·2	74·0	29·4	14	8	0·7



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The mean values for back fat show that all groups came below the maximum of 1⅞ in. for the shoulder, while for the loin measurement group 1 is at the maximum of 1⅛ in., groups 2 and 3 are below. The individual measurements of the thirty pigs showed that one of group 1, one of group 2, and none of group 3 were above the maximum at the shoulder. For the loin, seven of group 1 were slightly above the maximum, and none of the pigs in groups 2 and 3 were above the maximum. From these results it would appear that for the average type of Berkshire-Tamworth cross pig well fed from birth that the optimum rate of feeding lies slightly below that given for group 1 and a maximum of 5½ gallons to 6 gallons per pig per day will produce pigs of No. 1 prime grade at the carcass-weight given.

Restricted Feeding after Store Period.

In order to gain information on the effect of restricted rations on pigs that had been wintered in store conditions a number of pigs were wintered on various rations, an example being ½ lb. meat-meal, 1 lb. maize and roots giving a live-weight increase of 0·4 lb. per day. To compare fattened under typical conditions of commercial fattening with restricted rations twenty-five of these pigs were sold to at commercial piggery to be fattened on buttermilk. These pigs were full fed to a maximum of about 8 gallons per pig. The exact quantity could not be measured, but weekly weighings were obtained for the rate of fattening. The pigs finished their winter feeding at an average of 100 lb. weight. A fortnight was allowed for the pigs to become accustomed to the new ration of buttermilk, and weighing during the fattening-period commenced at a mean weight of 113·4 lb.

Group 4.

	Weights (Pounds).		Killing (per Cent.).	Length, Hip Bone to First Rib (Inches).	Back Fat (⅛ in.).		Rate of fattening, Pounds, Pig/Day.
	Live.	Carcass.			Shoulder.	Loin.	
Means	195·8	142·7	72·9	28·6	15	9	1·41

All pigs in the group were killed in ten weeks or less, and the progress of the pigs, together with carcass-measurements, are given in the group 4 table.

The maximum measurements laid down in the new grading systems for shoulder and loin of this class of pig is 1⅞ in. = 15 eighths for the shoulder, with a maximum of 9 eighths and a minimum of 6 eighths for the loin. While the mean values for the group are at the maximum the individual measurements showed that fourteen of the twenty-five were too fat at the shoulder and fifteen too fat at the loin. Sixty per cent. of this group would now be classed as No. 2 prime grade, with a corresponding cash difference of about £5 10s. compared with what would be received if all pigs had graded No. 1 prime.

Group 5.

	Weights (Pounds).		Killing (per Cent.).	Length, Hip Bone to First Rib (Inches).	Back Fat (⅛ in.).		Rate of fattening, Pounds, Pig/Day.
	Live.	Carcass.			Shoulder.	Loin.	
Means	194·8	140	71·8	29·1	13	8	1·1

It has been shown that if pigs are wintered in store condition for three months followed by quick fattening the carcasses produced are too fat. It was also stated previously that if such pigs are fattened on a restricted ration or by full feeding with part of the ration as roots, the carcasses produced will show a reduction in back fat, and grade satisfactorily. Trials carried out with various rations and with pigs commencing their fattening period at different weights substantiate this, and the following trials show the results that are to be obtained with such feeding.

Group 5 (pigs fattened on meat-meal, maize, and mangels).—These ten pigs were group and litter mates of those fattened commercially (group 4). At 104 lb. live-weight they were placed on a ration of 1 lb. meat-meal, 1½ lb. maize and mangels. The maize was increased to 2 lb. after five weeks' feeding. The mangels were fed to appetite throughout, and the pigs consumed about 30 lb. a day. These pigs were stied. This ration was fed for eleven weeks, followed by one week's fattening, when the mangels were replaced by 2 gallons of skim-milk. The mangels fed over the fattening-period formed 49·1 per cent.

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of the total ration, and returned 9s. 2d. per ton after deducting the cost of maize and meat-meal at current rates and skim-milk at 1d. per gallon. The group was slaughtered at 194·8 lb. in order to obtain a mean and variation in live-weight comparable with the twenty-five pigs in group 4.

Group 6.

	Weights (Pounds).		Killing (per Cent.).	Length, Hip Bone to First Rib (Inches).	Back Fat (⅛ in.).		Rate of fattening, Pounds, Pig/Day.
	Live.	Carcass.			Shoulder.	Loin.	
Means	200·1	142·0	70·9	28·4	12	7	0·97

The mean values are below the grade requirements, and the individual measurements showed that the pigs were 100 per cent. No. 1 prime grade, with an average reduction of ¼ in. of back fat at the shoulder and ⅛ in. at the loin. If a value of 10 lb. of roots equivalent to 1 gallon of milk is allowed, then the pigs received a maximum of five feed-units—*i.e.*, pounds of feed or gallons of milk—per day.

Group 6. — This group of pigs was wintered for twelve weeks on 1 gallon of skim-milk, ½ lb. meat-meal and swedes, and grew at 0·5 lb. per day. At 122·5 lb. live-weight they were placed on a fattening ration of 2 gallons of skim-milk, 1 lb. maize and swedes. The average consumption of swedes was slightly over 9 lb. per pig per day. The pigs had the run of cow pasture. The returns for swedes was 12s. 7d. per ton after deducting the cost of skim-milk at 1d. per gallon and maize at current rates. Swedes were fed to appetite and formed 23 per cent. of the total ration. The pigs received a maximum of 4 units per day if previous values for feed units are accepted.

The carcass-measurements for this group were as stated in the group 6 table.

The mean values obtained for back fat are well below the maximum, and the individual animals would all grade No. 1 prime.

Group 7.—This group was wintered for three months on ½ lb. of meat-meal and swedes to appetite. As might be expected, the growth-rate on this small amount of concentrate was very slow and averaged 0·3 lb. per pig per day, and at the end of three months the pigs averaged 84·4 lb. They were immediately stied and placed on a ration of 1 lb. meat-meal and mangels to appetite for three weeks. During this period the mangels-consumption averaged 22 lb. per head per day. At this stage the ration was increased by the addition of 1 gallon of milk per pig per day for three weeks, after which it was increased to 1½ gallons, the meat-meal and mangels being fed as before with an increase in the consumption of roots to about 30 lb. per pig per day. After eleven weeks of feeding this ration the mangels were replaced by skim-milk, the ration then being 1 lb. meat-meal and 3½ gallons of milk. This ration was fed from 173·5 lb. live-weight to the end of the fattening-period.

The live-weight gains during the period that roots were fed was 1·15 lb. per day, the roots averaging 59·2 per cent. of the ration. The percentage of roots in the ration over the total period was 40·7, and the returns for mangels was 14s. 6d. per ton after deducting the cost of meat-meal

Mammitis

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Season 1930/31—No losses.
" 1931/32—3 cows.
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" 1935/36—4 cows.
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I am still certain that inoculation against this trouble is efficient, economical, and by far the best treatment I know of. But clean yards and sheds, well attended machines and careful milking must go with it to do any good."—Yours truly,

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and skim-milk. It will be seen that the ration was one restricted to a maximum of 4½ units, and the results of such feeding are seen from the carcass-measurements in group 7 table.

Group 7.

	Weights (Pounds).		Killing (per Cent.).	Length, Hip Bone to First Rib (Inches).	Back Fat (⅛ in.)		Rate of fattening, Pounds, Pig/Day.
	Live.	Carcass.			Shoulder.	Loin.	
Means	200·5	145·9	72·7	29·25	14	8	1·0

The means for shoulder and loin fat are below the maximum allowed, while individual measurements showed that one pig graded down for shoulder fat and three for loin fat, the excess being ⅛ in. From the results obtained it can be seen that restricted feeding does combat that predisposition to lay on back fat in excess of grade standards and that 80 per cent. to 100 per cent. of ordinary Berkshire-Tamworth graded No. 1 prime where only 40 per cent. graded first grade on "full-fed" methods. It must be remembered that the pigs in these trials were, with the exception of groups 4 and 5, killed near the upper limits of the grade into which their weights fall. By killing this type of pig at about 195 lb. live-weight instead of 200 lb., the carcass would be about 140 lb. and well within the grade most suitable for the London market, and the back fat would then be less likely to fall on the upper limits of the grade to which the carcasses belong.

Winter Feeding and Carcass-quality.

Reference has already been made to the effect that variation of nutrition during the various stages of the pig's life has on the carcass produced. Our methods of winter feeding justify further reference to this point since a great number of our bacon carcasses are produced in spring and summer from pigs that have been wintered in store condition. From the results of the trials, pigs of the Tamworth-Berkshire cross wintered in store condition for three months will need to be finished off on a restricted ration of 4½ units to 5 units—*i.e.*, gallons of milk, &c. Excess of this ration, particularly in the latter stages, will result in overfat pigs. Further, from the measurements given for the carcass-length (hip bone to first rib) it will be seen that a store period of three months in the early stages does not give a longer carcass than is to be obtained with pigs fattened in about two months' less time. It is well known that unless starvation or deficiency conditions are imposed the framework of the young animal continues to grow, and in the examples previously given approximately the same length of carcass has been obtained whatever the method of feeding. The main issue being to keep the pigs growing through the winter as well and as cheaply as possible by the use of farm-grown crops and small quantities of concentrates. A further point that emerges from the trials is the use to which roots can be extended for early spring fattening when skim-milk is still in short supply and needed for sows and litters. No detrimental effects on the carcass produced is found, and there is an improvement in back fat.

Restricted Rations and Winter Feeding.

The use of restricted rations in fattening pigs at once brings home the fact that more pigs will be needed to consume the surplus skim-milk, and where four or five pigs were fattened on full-fed methods six or seven will be needed for restricted rations. This brings us back to the external problem of winter feeding. More pigs on hand in spring for milk-consumption will necessitate greater provision of winter feed for those pigs. In turn, more sows are required to produce these pigs, and they in turn must be fed during the winter. Root crops are undoubtedly the means whereby pigs can be cheaply and efficiently wintered. Roots can also form a large portion of the fattening ration with an improvement in carcass-quality by a reduction in back fat. They are undoubtedly one of the most important factors in New Zealand's methods of wintering the autumn litters for first-grade bacon-production in the following spring and summer.

Parasites of the Pig in New Zealand.

J. E. McIlwaine, M.R.C.V.S.

Lice and Mites.

THE principal external parasites of the pig are lice and mites, the latter being responsible for the several outbreaks of mange in pigs which have occurred in various districts from time to time.

The pig-louse (*Haematopinus suis*) is common on pigs in all districts. It is one of the largest specimens of lice found to infect the domestic animals, although occasionally in cattle a fairly large specimen is seen. All specimens of lice belonging to the Hæmatopinus family are blood-suckers and have strong mouth parts to pierce the skin and suck up blood.

The pig-louse is easily seen by the naked eye and, although it appears to do little harm to adult pigs, the parasite should be eradicated, as it is a serious menace to young pigs and brings about an unthrifty condition and allows other organisms to take toll of the young pigs. In the pig the common symptom of lousiness is the irritation and amount of rubbing which takes place against posts and wire fences. The irritation set up may be so severe that the animal rubs the affected part until the skin becomes abraded and bleeds. Here, then, is an abrasion which may lead to infection by the spirochæte organism, the common cause of the nasty cancerous-looking sores which are known as necrotic or spirochætal ulcers. Lousiness in pigs also paves the way for the entrance of the mange-mites and the setting-up of mange; in fact, on premises where mange in pigs occurs lice are commonly seen on the infected pigs.

As lice are easily eradicated by the application of crude fuel oil, either by hand-dressing, by providing oiling-posts in the pig paddocks, or by dipping in a bath containing a layer of oil on the surface of the water, no difficulty should be experienced in dealing with the parasite. Whatever treatment is adopted should be repeated after fifteen days to kill any parasites which have hatched out since the previous treatment.

Mange in Pigs.

The common form of mange in pigs seen in New Zealand is what is known as sarcoptic mange. This common mange is caused by the parasite *Sarcoptes scabiei* V. *suis*. This parasite cannot be seen by the naked eye, as it is only $\frac{1}{50}$ in. long. Where it is suspected, how-

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ever, scrapings can be taken from suspicious parts of the body, and the scrapings are then examined under the microscope.

The symptoms of mange in pigs are similar to those of mange in other animals. The skin becomes thickened, wrinkled, and thrown into folds on the affected parts of the body. This is due to the burrowing nature of the parasite, which lives in tunnels under the skin where the female lays her eggs. The continual burrowing and irritation causes a thickening of the skin and a constant rubbing on the part of the affected animal. Affected animals often rub until the areas become raw and bleeding, and occasionally scabs may be seen. The dry, thickened, corrugated skin of a pig from which the bristles have been rubbed off must be suspected as being affected with mange.

Diagnosis.

In order to determine definitely whether mange exists in a herd, scrapings from the skin should be collected in a glass container and forwarded to the Wallaceville Veterinary Laboratory for microscopic examination for the parasite. The scrapings should be collected from the most suspicious area of the skin, a blunt knife being used to scrape the area deep enough to cause the appearance of blood, the parasite being embedded. If the disease is suspected or diagnosed on a property the owner must report the matter to the nearest office of the Live-stock Division of the Department of Agriculture, as the disease is scheduled under the Stock Act.

Effects of Mange.

All pigs suffer severely from an attack of mange due to the intense irritation and itching. Young pigs suffer most, and an unthrifty condition results with low vitality. General development and fattening are retarded, and severe cases may lead to general debility and death.

Mange in pigs is very contagious, and is usually spread from pig to pig by direct contact, which readily occurs in the pens, or indirectly, by means of rubbing-posts, contaminated litter, or contaminated pig-pens. The introduction of an affected pig to a clean farm will enable the disease to spread to all pigs on the farm, irrespective of breed or size of the pigs.

Treatment of Lice and Mange.

Crude oil or fuel oil will be found most effective in the control of both lice and mange in pigs. Whereas the treatment of lice has already been briefly referred to, the same treatment to be effective in the case of mange requires to be more conscientiously applied. In the latter case, although hand-dressing may deal with a small number of pigs, the dipping of pigs is by far the most effective and the most economical method of thoroughly cleaning up the disease where a number of pigs have to be dealt with. The entire surface of the head and body should be attended to and the hand-dressing or dipping repeated again after about a week in the case of mange. As a rule two dippings in the fuel-oil dip will eradicate mange in pigs. As the fuel oil is superior to the lime and sulphur mixture in dealing with mange in pigs, and as it is also effective against lice, it should be accepted as the standard preparation for the treatment of these two parasites.

Any small sheep-dip available can be utilized for the dipping of pigs, or a small concrete dip may be specially erected for the purpose. The dip is filled with water on which floats about 4 in. to 6 in. of the fuel oil. The pig passing through the dip and leaving same gets a coating of oil all over the body. A similar dipping repeated after a week will clear up the majority of mange cases. In the absence of mange such treatment will be found effective against lice, the interval between dipping being one of fifteen days in this case.

Where mange is being dealt with it will be necessary to deal with the sties, bedding, rubbing-posts, &c., and here the burning of all litter and the thorough disinfection of all sties is necessary before clean pigs are again placed in them.

The woodwork in the piggery should be either tarred or lime-washed, and all rubbing-places such as gates and posts should be similarly treated. In short, very thorough measures are necessary to eradicate mange.

Methods which may be used to control lice on pigs to a limited extent but which could not be considered satisfactory to deal with an outbreak of mange, consist of the provision of oiling-posts in the pig paddock. Any post which is normally used by a number of pigs for rubbing may be covered with sacking and soft rope. The sacking, &c., is saturated with fuel oil from time to time and the pig takes advantage of the post and thereby gets a layer of oil on the part of the body being rubbed. Oiling-posts of this nature serve to control lice on pigs and serve a very useful purpose.

As concrete wallows for pigs are not used to any extent in New Zealand little advantage can be taken of them. Where, however, a concrete wallow is available, a layer of oil on the surface of the water will afford an additional means of treating pigs for lice.

Fig. 1.—Thorn-headed worms *in situ*.
[*A. L. Bryant, photo.*

Internal Parasites.

Probably the most common type of internal parasitic infection of pigs seen on post-mortem is what is known as the hydatid cyst. Hydatid cysts are the intermediate stage in the development of the minute tapeworm of the dog (*Taenia echinococcus* or *Taenia granulosus*). The cysts are found commonly in the livers and lungs of pigs and are recognized as watery cysts of varying size, although an occasional degenerated caseated cyst may be seen in older pigs. The cysts may be seen more rarely in other organs and other situations in the body.

The pigs become infected with cysts from the ingestion of food or water contaminated with the eggs passed in the droppings of a dog which harbours the small tapeworms. In the same manner sheep, cattle, and human beings become infected with similar cysts. It is therefore advisable to treat the dogs on the farm for tapeworms from time to time to prevent hydatid infection in all the domestic animals and man. As a further precaution against this infection in pigs the closer association of pigs and dogs should be prevented unless the dogs have been treated for tapeworms.

A larval stage of another tapeworm of the dog may also be seen in the viscera of pigs. This is known as *Cysticercus knuicollis*, and is described as a watery bladder-like cyst, frequently seen suspended from the liver, diaphragm, or mesentery when a pig is opened up. It is the cystic stage of the tapeworm of the dog (*Taenia hydatigena*).

To prevent the pigs becoming infected with the above cysts access to the faeces of dogs by pigs should be prevented, and all dogs on the farm should be treated regularly for tapeworm infection. To prevent the reinfection of dogs on the farm all viscera of sheep or pigs containing cysts should be boiled before being fed to dogs.

The Large Round Worm.

The large round worm of the pig (*Ascaris suis* or *Ascaris lumbricoides*) is seen from time to time. It is easy to recognize on account of its size, and may grow up to 15 in. in length. It is white in colour, tapes towards each end, and has been mistaken by farmers for the common earth-worm. It is found in the small intestine of the pig, and occasionally may be seen in large numbers.

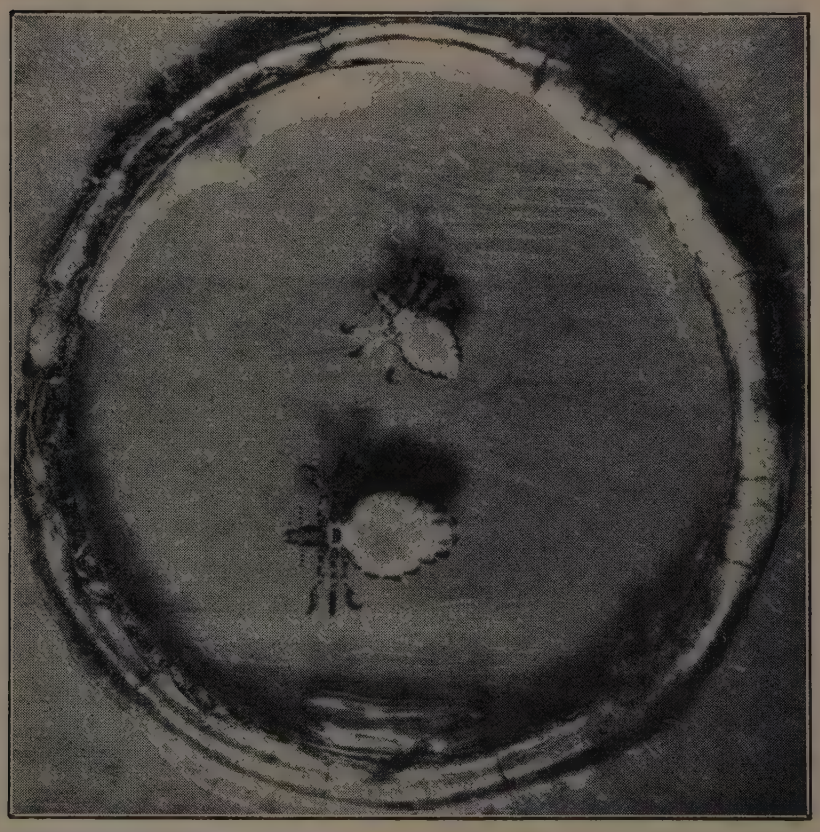

Fig. 2.—Pig-louse (*Haematopinus suis*) photographed on a slide. Diameter of circle, ¾ in. [*A. L. Bryant, photo.*

An interesting life-history of this *Ascaris* has been worked out, and on account of the comparative absence of the condition known as "thumps" in young pigs in New Zealand one is of the opinion that a heavy *Ascaris* infection of pigs is not common in the Dominion.

The eggs of the female *Ascaris* are passed out in the droppings of the pig. The eggs then hatch out under suitable conditions of moisture and temperature, and the pig becomes infected through the ingestion of contaminated food or water containing the infective larvæ. The young larvæ penetrate the wall of the intestine and are carried in the blood-stream and eventually settle in the capillaries of the lungs. Here a heavy infestation may set up serious lung troubles, of which one has been recognized under the name of "thumps," due to the laboured breathing. Pneumonia may be set up by the migrating larvæ at this stage.

Eventually the larvæ leave the lungs, move up the wind-pipe into the mouth, are swallowed, and then settle down in the intestine, where they reach maturity and eggs are again passed in the droppings.

The *Ascaris* is not considered a dangerous worm in pigs as it is not a blood-sucker. It lives on the contents of the alimentary canal, and in young animals a heavy infestation may cause some stunted growth. However, an occasional worm is passed by animals apparently in perfect health. There is a danger, however, that the presence of the worms in the bowel and the puncturing of the bowel-wall by the worms may lead to the spread of bacteria causing disease, such bacteria as *S. Suipestifer*.

At the same time, under an extensive rather than an intensive grazing system the pigs should be less susceptible to infestation with this worm and this is the position in the Dominion.

Treatment.

Where the worm has been shown to be prevalent in young pigs and appears to be interfering with the growth of same a suitable worm medicine should be given after a period of fasting. The individual dosing of each pig is recommended when oil of chenopodium is used as the worm medicine. Starve the pigs for twenty-four hours and dose each pig with a mixture containing one part of oil of chenopodium per fifty parts of castor oil. For pigs of 30 lb. weight 2 oz. of the mixture can be used, 60 lb. weight pigs may be given 4 oz. of the mixture. The dosing of larger pigs is not recommended.

Other agents which are frequently used by farmers as worm medicines to be given in the food are copper sulphate (bluestone)

and sulphate of iron. Owners frequently resort to these agents in the case of stunted pigs when the cause of the stunted growth is not worms but undernourishment or malnutrition. Such treatment cannot be recommended. Many nostrums of doubtful value are frequently used, but it must be clearly understood that none of these can take the place of proper feeding and the maintenance of a reasonable plane of nutrition, more especially in the case of young stock.

Prevention of Round-worm Infestation.

Prevention is much more important than the treatment of infested pigs. Where a large number of pigs are kept on the intensive system the prevention of round-worm infestation mainly depends upon a reasonable standard of hygiene and sanitation. Under these circumstances concrete sties and yards are necessary to afford easy cleaning, the removal of infected fæcal matter containing eggs at frequent regular intervals must be attended to, and sows farrowing should be provided with clean, sanitary farrowing-pens. When the sows are brought into the clean farrowing-pens a wise precaution against worms would be the thorough washing of the udder and teats to remove all eggs and larvæ which may be adherent. The feeding of pigs from platforms subject to contamination is a source of danger to be guarded against. Even troughs are subject to fouling and should be frequently cleaned out. Reasonable hygiene and sanitation should reduce the risk of infestation to a minimum.

Thorn-headed Worm.

The thorn-headed worm is another large round worm which has been recorded as infesting pigs in one part of New Zealand. Specimens of the worm have been received for identification from the North Auckland district in 1933. This is also a large whitish-coloured worm and may measure up to 15 in. in length. The technical name given to this species is *Macracanthorhynchus herudinaceus*. This worm also inhabits the small intestine of the pig and attaches itself to the intestinal wall, where it reaches maturity. The eggs of the adult worm are passed in the droppings of the pig. The eggs are then consumed by certain beetle grubs where the young larvæ hatch out and become encysted in the grug. The pig, when rooting, finds the infected grubs and eats them, and thus the life-cycle of the worm is completed, the ingested larvæ attaching themselves to the bowel-wall where they reach maturity.

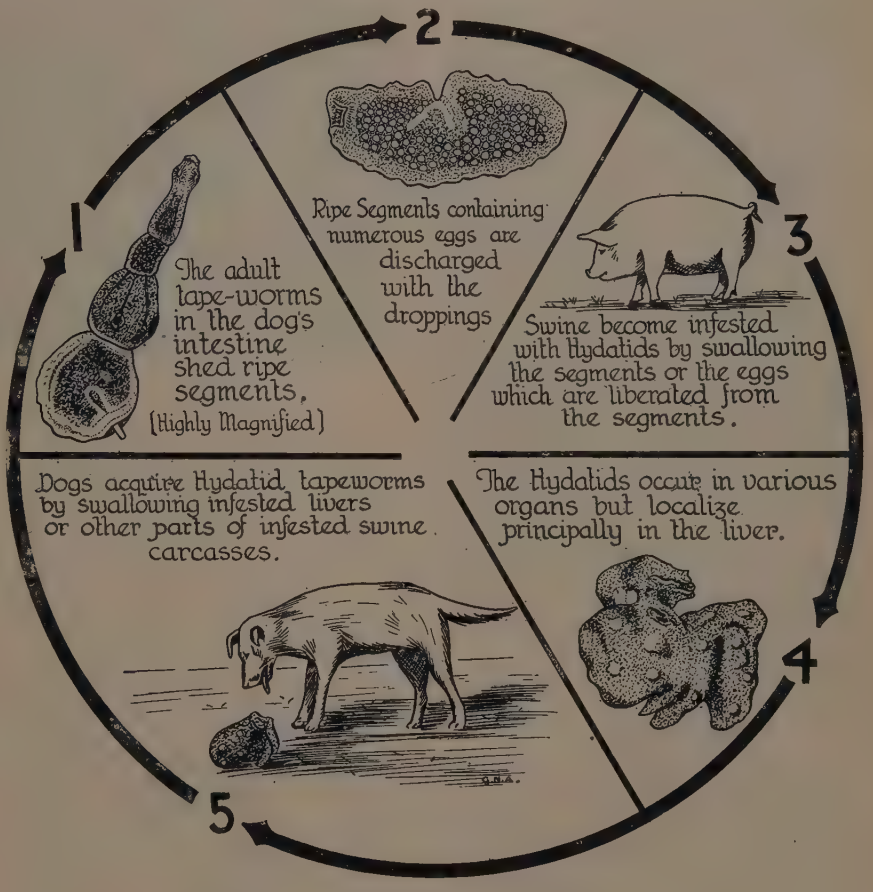
2
Ripe Segments containing numerous eggs are discharged with the droppings
1
The adult tape-worms in the dog's intestine shed ripe segments. (Highly Magnified)
3
Swine become infested with Hydatids by swallowing the segments or the eggs which are liberated from the segments.
Dogs acquire Hydatid tapeworms by swallowing infested livers or other parts of infested swine carcasses.
The Hydatids occur in various organs but localize principally in the liver.
4
5

Fig. 4.—Life-history of hydatid tapeworm.

The treatment of pigs for this worm is similar to that recommended for *Ascaris*, but it is a more difficult worm to remove. Strict hygiene and sanitation is here again recommended as the line of prevention. Under an extensive system of grazing one would expect very little trouble from this parasite; in fact, so few specimens have been sent forward and recorded that the incidence of the parasite must be very low and confined to a very limited area. A change of site and the avoidance of permanent pasture for pigs would be necessary in the case of a heavy infestation on any property.

Small Stomach Worms.

The smaller species of worms which may occasionally be found in the stomach

Fig. 3.—Bladder-cysts. [*A. L. Bryant, photo.*

of the pig measure about ⅛ in. to ¾ in. in size. These small round worms are mainly of academic interest, the intermediate host being dung-frequenting beetles. They are not considered to be of much importance, and hygienic measures to control the beetles should minimize the risk of any gross infestation in the pig. The writer is of the opinion that these parasites are not common in pigs in New Zealand where so much milk by-products are fed to pigs.

Whip-worm.

This worm of the pig is found in the cæcum or blind gut and in the large bowel. It is known as *Trichuris trichuria*, and gets the name of whip-worm from its resemblance to a whip, one portion being stout and the remainder thin and threadlike. It may measure up to 1 in. to 1½ in. On account of its location so far back in the alimentary canal its eradication by medicinal agents is different. Here, again, it is necessary to emphasize the best preventive measures in regard to the general hygiene and sanitation of pig-keeping and the extensive rather than the intensive system of pig-grazing.

Lung-worms of Pigs.

A serious outbreak of lung-worm in pigs is occasionally seen in New Zealand. A heavy infestation can take place where a large number of young pigs of about the same age are running together under crowded conditions and on a poor feed-supply. Such a case was seen by the writer where about a hundred young pigs of the same age were running in an orchard in early winter, the main diet being waste apples. The bronchial tubes may be almost filled with the small thread-like worms and mucus, and a severe bronchitis and cough is set up which may be followed by pneumonia and death.

The pigs are infested through eating earth-worms, the earth-worms acting as intermediate hosts in the life-cycle of the parasite. Two species of lung-worms are recognized in the pigs, and these may measure up to 2 in. in length. They are known as *Metastrongylus apri* and *M. pudendotetectus*.

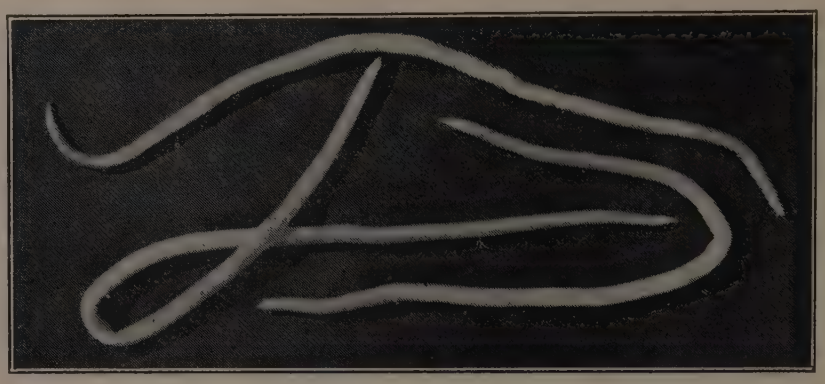

Fig. 6.—Pig ascaris. [*A. L. Bryant, photo.*

Treatment and Prevention.

As with lung-worm infestations in lambs and young cattle, good nursing is the best treatment. Affected animals should be removed from the pasture and warmly housed and given nourishing food to enable them to throw off the parasites.

Avoid overstocking with young pigs on a low-lying, wet pasture, and ensure an adequate feed-supply of meat-meal to prevent pigs rooting for earth-worms.

A light infestation causes no appreciable harm, and pleurisy in pigs probably accounts for more coughing than lung-worms under normal conditions of pig-farming in New Zealand.

Kidney-worm.

The kidney-worm of pigs (*Stephanurus dentatus*) is not common in New Zealand, only one specimen being recorded ex a pig killed at a slaughterhouse.

The worm, when mature, may be from ¾ in. to 1½ in. in length and, as the name suggests, is found in the region of the kidney, or in the kidney-fat or flare-fat. In normal cases the mature female worm lays her eggs which are voided in the urine. The eggs hatch in one or two days, and five to eight days later the young larvæ are ready to reinfest the pig. The pig may become infested by swallowing the young larvæ or the larvæ may burrow direct through the skin. The larvæ eventually reach the liver, where they remain for five or six months and, on reaching maturity, the worms migrate to the kidney-fat or to the kidney itself where the female lays its eggs.

If prevalent, this worm would be a serious parasite to contend with as infected pigs' livers are seriously damaged, and carcasses with lesions and abscesses in the kidney region would be difficult to pass for export. Moreover, infected pigs would be unthrifty and more difficult to fatten.

As the worm is not prevalent in New Zealand measures of treatment or control need not be seriously considered in this article. The main control measures are aimed at the destruction of the eggs voided in the urine, the eggs being very susceptible to direct drying by the sun. Therefore, hygienic and sanitary measures to remove the urine from sties by providing efficient drainage and bringing about the desiccation of voided eggs is the main line of attack. Owing to the location of the worm no medicinal treatment for its removal can be recommended. It is of particular importance that all people associated with the pig industry should be on the watch for specimens of the kidney-worm in pigs, as this parasite has proved a menace in other countries.

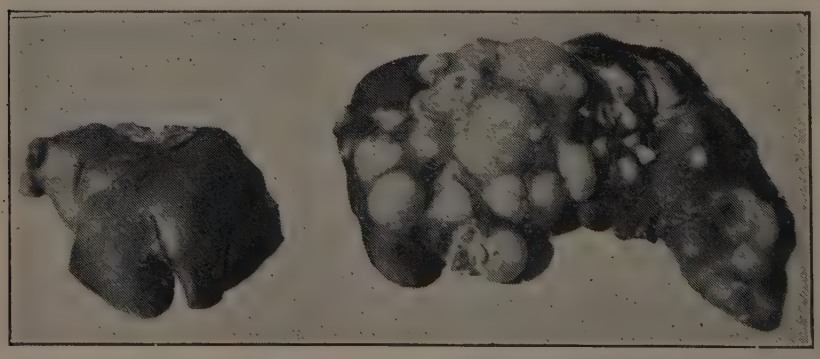

Fig. 5.—Hydatid cysts of liver. Normal and abnormal. The size of the livers is comparative. [*A. L. Bryant, photo.*

General.

An attempt has been made to give an outline of the common parasites (external and internal) which may be found in

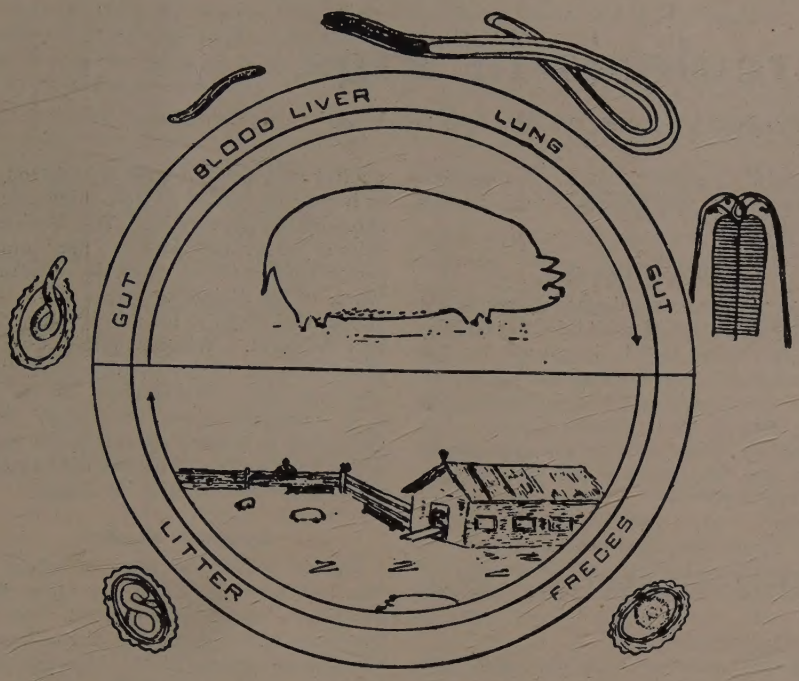

Fig. 7.—Life-cycle of pig ascaris. Reproduced from Cameron's "Internal Parasites of Domestic Animals."

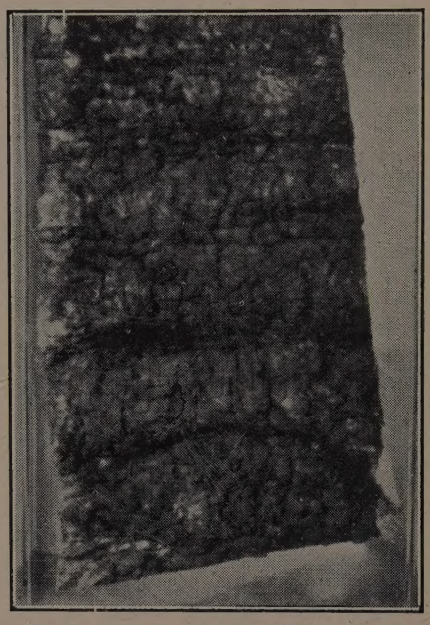

Fig. 8.—Specimen of skin of pig affected with mange.
[*A. L. Bryant, photo.*

pigs in New Zealand. Such parasites as coccidia (the common liver-fluke of sheep and cattle may infest the pig on rare occasions in liver-fluke districts), the bladder-worm causing pork-measles, the slender thread-worm known as *Trichinella spiralis* (the cause of trichinosis in pigs, rats, and man), the nodular gut-worms of pigs belonging to the *Oesophagostomum* group and causing "pimply" gut, have not been dealt with as these have not been recorded in pigs in New Zealand.

Rarely is the pig-owner in New Zealand asked to deal with a serious worm-infestation in pigs under our present system of raising and fattening of pigs. The extensive rather than the intensive system of grazing, the large amount of milk by-products available as feed in troughs, the comparatively small amount of other foodstuffs used and their use mainly from troughs, the irregular farrowing-dates of sows preventing a large number of young pigs of a susceptible age being on one farm at the same time; all these factors tend to control the internal parasitic position.

Where, however, worms are suspected as being of serious consideration the matter should be thoroughly cleared up. A suspected pig should be killed and examined and the presence of the worms either confirmed or negatived. If confirmed, then a suitable worm medicine should be obtained and the individual dosing of each pig should be carried out as required. If no worms are present, then dosing is unnecessary and a waste of time and money.

At the present time many worm medicines are given to pigs in their food, and such a practice has nothing to commend it. The writer has seen farmers using a bluestone solution mixed in the food when there was no evidence that worms were present at all, other than their presence was suspected from the amount of coughing. The use of this worm medicine in the food in such cases is unsound in practice. The medicine is not effective against the worms if present, and, secondly, if no worms are present, the medicine is nauseating and definitely harmful to the pig. Coughing in young pigs, unlike that in lambs and calves, is mainly due to pleurisy and general pulmonary troubles, and only on rare occasions is a heavy infestation with lung-worms the cause of the coughing.

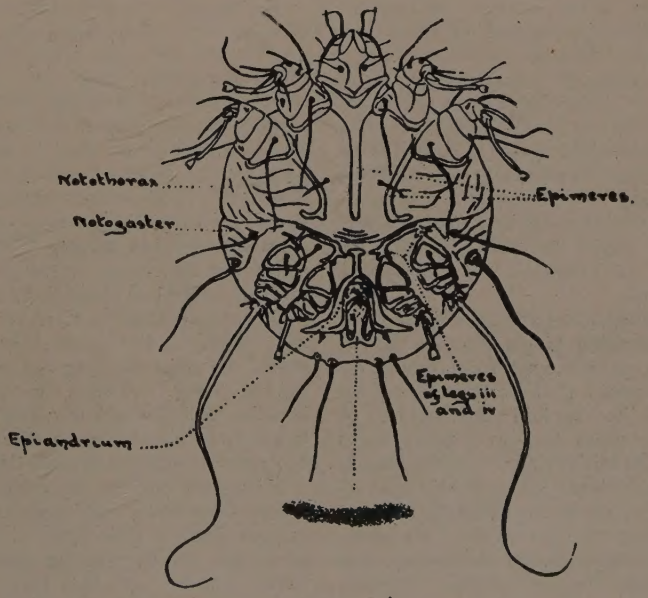

Fig. 9.—Diagram of parasite *Sarcoptes scabiei.*

Tuberculosis in Pigs.

By E. J. Simmons, M.R.C.V.S., Veterinarian, Longburn.

A FIRST glance at the pig industry of New Zealand from a veterinary point of view shows producers to be fortunate in one very important respect. This is the absence throughout the Dominion of any serious epidemic diseases of pigs—diseases, that is, which pass rapidly and easily from pig to pig and directly or indirectly from herd to herd, with consequent heavy losses over a wide area. Swine-fever, for example, in Europe and America takes a continuous toll of pigs.

Except for one outbreak about five years ago, which in comparison to the state of affairs in Europe can be said to have been nipped in the bud, swine-fever has been unknown for thirty years. Another great scourge widely spread through the Old World and one which attacks animals of some value—fat pigs, gilts, boars, and sows is swine-erysipelas. Only a very few cases of it have come to light in New Zealand, and those have occurred in an unusual form. A major and typical outbreak is quite unknown. In these respects the conditions in this country must be the envy of very many producers in the Northern Hemisphere.

One cannot but be struck, however, by the amount and widespread nature of other—though, in comparison, minor—diseases of pigs in New Zealand. They reveal themselves particularly in pork and bacon carcasses on inspection at the meat-works, and continually result in a number of carcasses being wholly condemned, partly condemned, rejected for export, or graded down. Through the reduced price paid for condemned carcasses alone some thousands of pounds are lost to producers annually. But in spite of the fact that the pig is inherently softer in constitution and has more opportunity to contract disease under domestication, it is contended by veterinarians and pig-husbandmen that much of this disease can definitely be reduced by improved management.

Good management springs largely from an understanding of pig disease, and in these notes it is hoped from month to month to assist that understanding by attempting to explain the nature of common troubles and to suggest ways and means of mitigating or avoiding them. As usually entered on a works killing-sheet, they comprise the following : Tuberculosis, pleurisy, peritonitis, abscesses, arthritis, pyæmia, faulty castration, lack of condition, lack of finish, thinness, wounds, bruises, and deformities. Tuberculosis will be dealt with in this article.

Disease Described.

The word means a disease characterized by the formation of small tubers or nodules in the body, and it is caused by the invasion of a species of germs, or bacilli, as they are called, and their multiplication in a few or many of the organs. The yellowish tubers, with which most stockmen and all butchers will be familiar, contain material of cheesy or gritty consistency, and are simply heaps of debris left where tissue has been destroyed by the poisonous activity of the germs. If the invasion of the germs is not great and not many tubercles are formed, little or no illness results.

If vast numbers enter the body and settle in many parts or throughout a vital organ, producing many tubercles, the animal loses condition and shows symptoms according to the organs most involved. For instance, a bad affection of the lungs results in a type of pneumonia of fairly long duration, in which the pig develops a dry cough and tends to sit on its haunches, breathing noisily and with effort. It gradually loses all condition, and eventually dies. If the bowel is attacked, ulcers may be formed on the lining, and the pig will show symptoms of diarrhœa, a poor appetite, and great wasting.

The pig picks up these germs in its feed or from the soil of the paddock or the floor of the sty. In appearance, under the microscope, they are rod-shaped structures (hence the name bacillus), have a waxy covering for protection, and are so extremely small that it would take perhaps two hundred placed end to end to cross the head of an average pin. They never multiply, in nature, outside the animal body, but having left it in the sputum, urine, dung, or discharges of an infected animal or remaining in a decomposing carcass they lie wherever deposited in a conserved state until they are again eaten or otherwise gain access to the animal body. Then the process of invasion commences anew, and its success lies between the power of the germ and the resistance of the animal tissues.

A pig may pick up the germ in various ways—frequently and most easily from infected feed or from infected pigs in the same sty, or by grazing after infected cattle, poultry, or other pigs. Infected poultry may bring it to sties and troughs, or it may be carried in from elsewhere by attendants and vermin. The feeding of skim or whey, some of which may contain germs from infected cows, is a common source of the disease in young pigs. Unboiled offal illegally fed to pigs may contain the germ. When a pig picks up the germs it is not bound to become infected. The body may destroy them, or the pig may overcome them after they have multiplied to a small extent in the body, and a few inactive tubercles may remain as harmless blemishes in an organ.

Lymphatic Glands.

This is a common state of affairs in man. When the bacilli are taken into the mouth, numbers may track through the lining of the mouth or, if swallowed, through the lining of the intestine and reach a nearby lymphatic gland. A lymphatic gland is a kind of filter-bed designed, among other things, to cope with invading germs, and all parts and organs are supplied with them. Connecting all lymphatic glands is an intricate system of vessels which exists quite apart from the blood-vessels, and whose chief function is to drain the tissues of their waste products. It is through these lymphatic vessels that a heavy infection with tubercle bacilli usually spreads, tracking through the body and reaching various organs, the efficient working of which may be greatly impaired by the formation of many tubercles.

The same germs are capable of infecting man. This means that if, in the course of inspection, tubercles are found anywhere in a carcass, the surrounding parts have to be condemned as unfit for human consumption. Thus a head, a ham, lungs and heart, liver, or intestines may be condemned because of tubercles in them or their glands. If tubercles are found in more than a very few parts of the one carcass the disease is considered widespread, or generalized as it is termed, and the whole carcass and offals are condemned. In generalized cases tubercles (sometimes masses of them) may be found in the lining of the chest or the belly. They can occur in any or all of the internal organs, in the muscles, the bones, the joints, the skin, and even the brain.

Unfortunately, the pig is rather susceptible to tuberculosis, and a great many carcasses necessitate the condemnation of various parts, especially the head and tongue. There is a distinct tendency,

too, for the disease to become generalized, and from 2 per cent. to 3 per cent. of all pigs examined in meat-works, amounting in value to some thousands of pounds, are wholly condemned because of it.

If the works killing-sheet shows that a certain number of pigs have been partially condemned or condemned for tuberculosis, the producer should try at once to find out the source of infection on his farm. If milk products derived from his own herd are used, the necessity for an inspection of the cows is obvious. In other cases, improvement may result from cleansing the troughs, pipes, and, if practicable, the tanks with hot water and a good farm disinfectant. The frequent scrubbing of sties, the buying of pigs from a known source or the isolation of newly purchased pigs, the avoidance of overcrowding, and provision of a run at grass from which cattle and poultry, if possible, are excluded, help to reduce the disease.

Warning Symptoms.

Sows or boars with swellings about the lower jaw and neck—which may be grossly infected glands—should be looked on with suspicion. A sow may on occasion be infected in the udder and transmit the bacilli to her suckling litter, all pigs of which would develop general tuberculosis. Any sow with a hard enlargement in the udder should be suspected. Sometimes, if the trouble is relatively bad and other sources of infection appear absent, suspicion may also be directed towards apparently healthy breeding-stock as well as the indefinite cases mentioned. All these may be tested for the disease by a veterinarian in the same way as cattle. Sick pigs of any sort should always be isolated, and those that are very unthrifty killed and buried in lime.

In regard to poultry, if birds are noticed to be dull and anæmic, going light, going lame, or dropping their wings, or are frequently found dead, there is at least grounds for suspicion that they are infected with tuberculosis. Government Veterinarians and Stock Inspectors exist for the investigation of these problems, and their advice should always be sought. Otherwise there is a danger of infecting the farm with animal excrement of all sorts containing the bacilli.

Tuberculosis, very rare among wild and range animals, has become a menace to stock in proportion to the increase of intensive farming methods. Watchfulness, therefore, and careful management are the only means the farmer has of lessening the great waste from this disease.

Pig Census Returns.

IN October, 1937, field officers of the Department of Agriculture were asked to collect information from farmers about pigs, and to date this "census" has been taken at the end of every three months. It is proposed to continue taking it until further notice.

The information so collected is used solely by the Department of Agriculture, and in no case is the identity of any farmer known, except by the officer collecting the information. The information is forwarded to Head Office, Wellington, and bears no names, each farmer being indicated by a number.

It is impossible to offer any advice or give assistance to the industry unless sound information is available about it, and it is hoped that this "census" will before long supply that information. Due to the fact that this work has only just started and to the time required to sift and analyse the information supplied it is not yet possible to get much that is of interest to the producer out of it. However, as soon as it is possible to make use of it the information obtained will be made available through the *Journal*.

Producers are asked to continue with the very valuable assistance given to date in supplying the information asked for.

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